ENVIRONMENTAL ASSESSMENT WORK PLAN REPORT

Prepared on Behalf of:

Al-Kel Alliance, Inc.

2012 N. Goode Road
Wilmer, Texas

Project No. 84800583-01

March 2012

TITAN ENGINEERING, INC.

ENVIRONMENTAL ASSESSMENT WORK PLAN

(Rev 0)

Al-Kel Alliance, Inc.
2012 N. Goode Road
Wilmer, Texas 75172

Prepared on Behalf of:

Al-Kel Alliance, Inc.
2012 N. Goode Road
Wilmer, Texas 75172

Prepared by:

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March 2012

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Environmental Assessment Work Plan

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I. TITLE AND APPROVAL PAGE

This Work Plan describes the requirements for environmental assessment activities at the Al-Kel Alliance, Inc., facility in Wilmer, Texas.

Title of the Project: Environmental Assessment of Al-Kel Alliance Facility

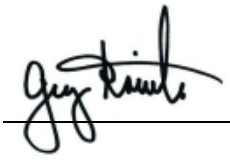
Organization Responsible for Work Plan Preparation: TITAN Engineering, Inc. on behalf of Al-Kel Alliance, Inc.

Effective Date of the Work Plan: March 2012

March 22, 2012

Brian Sims
TITAN Engineering, Inc.
Project Manager

Date



March 22, 2012

Greg Rainwater
TITAN Engineering, Inc.
Quality Control Manager - QA/QC Officer

Date

II. DISTRIBUTION LIST

The following persons will be provided copies of the Work Plan and any subsequent revisions.

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III. ACRONYMS AND ABBREVIATIONS

Al-Kel	Al-Kel Alliance, Inc.
bgs	below ground surface
CI	corrosivity and ignitability
COC	chemical of concern
CoC	chain of custody
CSM	Conceptual Site Model
CY	cubic yard
DOT	Department of Transportation
DQO	data quality objectives
ft	feet
EPA	Environmental Protection Agency
GWBU	groundwater bearing unit
HSP	Health and Safety Plan
HSA	hollow stem auger
HSC	Health and Safety Coordinator
IDW	investigation derived waste
in	inch
LPM	Laboratory Project Manager
LQAO	Laboratory QA Officer
LSC	Laboratory Sample Custodian
MSDS	material safety data sheet
MS/MSD	matrix spike/matrix spike duplicate
NIOSH	National Institute for Occupational Safety and Health
PARCC	precision, accuracy, representativeness, completeness, and comparability
PC	Project Coordinator
PCL	protective concentration level
PID	photo-ionization detector
PM	Project Manager
POTW	publically owned treatment works
PP	priority pollutants
ppm	parts per million
ppmv	part per million by volume
QA	quality assurance
QAM	Quality Assurance Manual

QAPP	Quality Assurance Project Plan
QC	quality control
QCM	Quality Control Manager
RCRA	Resource Conservation and Recovery Act
RPC	Regulatory Project Coordinator
RPD	relative percent difference
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedures
SRM	standard reference materials
SVOC	semi-volatile organic compound
TAT	turnaround time
TCEQ	Texas Commission of Environmental Quality
TITAN	TITAN Engineering, Inc.
TOC	top of casing
TPH	total petroleum hydrocarbon
TRRP	Texas Risk Reduction Program
UAO	Unilateral Administrative Order
VOC	volatile organic compound

1.0 FORWARD

This Environmental Assessment Work Plan ("Work Plan') for the assessment of environmental media has been prepared on behalf of Al-Kel Alliance, Inc. ("Al-Kel") by TITAN Engineering, Inc. ("TITAN") in response to a Unilateral Administrative UAO ("UAO") issued by the U. S. Environmental Protection Agency ("EPA") to Al-Kel on January 20, 2012. The UAO (Docket Number RCRA-06-2012-0924) was issued pursuant to Section 3013 (a) of the Resource Conservation and Recovery Act, 42 U. S. C. (SS) 6934(a) following EPA's review of records and on-site visit conducted during August 2011. The Al-Kel facility subject to the UAO is located at 2012 N. Goode Road, Wilmer, Dallas County, Texas ("Site"). EPA has concluded that environmental impacts to soil, groundwater, sediment and surface water may have occurred at the Site in association with Al-Kel's operations.

The UAO requires the assessment of environmental media to allow for delineation of any environmental impacts. Findings from assessment activities shall be evaluated using the protective concentration levels ("PCL") provided in the Texas Risk Reduction Rules ("TRRP").

2.0 OBJECTIVE

The objective of this Work Plan is to develop a scope of work that incorporates a systematic approach for assessing environmental media that may be impacted at the Site. The assessment will be conducted using a phased approach whereby an initial evaluation of surface and subsurface soil will be conducted. The initial assessment will be focused at Site locations where releases of constituents of concern ("COC") have potentially occurred, based on operations conducted by Al-Kel, observations made by EPA during a Site visit, and allegations made by individuals in the form of complaints to regulatory agencies. The initial assessment will provide for a determination of the presence or absence of potential COCs in soil. If the initial soil assessment findings indicate that soil exhibits COC concentrations above applicable PCLs for direct contact through combined ingestion, dermal contact of inhalation of air-born soil particulates, then the soil investigation will be expanded at the area of concern to allow for delineation of impacts to soil. Likewise, if the initial soil assessment findings indicate that an applicable soil-to-groundwater PCL is exceeded, the investigation will be expanded to include an investigation of groundwater at the area of concern. Thus, implementation of any expanded soil and/or groundwater investigation activities will be contingent on identification of COCs in soil at concentrations exceeding applicable PCLs.

3.0 WORK PLAN FORMAT

This Work Plan consists of five documents that provide guidance for field data collection and evaluation. Each Work Plan document is not intended to serve as a stand-alone document; rather, the components of the Work Plan are interrelated and should be treated as such. The components of the Work Plan include the following:

A. Conceptual Site Model ("CSM") – The CSM includes a summary of Site operations and characteristics, and the potential for exposure to an environmental release. The CSM provides the basis for selecting of sample locations, media and analytical parameters.

B. Sampling and Analysis Plan ("SAP") – The SAP describes the field methods and procedures to be followed during sample collection activities. Implementation of these protocols will ensure that field data are properly collected and handled such that the collected data are representative of Site conditions.

C. Quality Assurance Project Plan ("QAPP") – The QAPP describes methods for assessment of data collected as outlined in the SAP to ensure that data quality is acceptable and representative of Site conditions.

D. Health and Safety Plan ("HSP") – The HSP establishes requirements for protecting the health and safety of workers, visitors and the public during implementation of the SAP. The HSP summarizes personal protective equipment and safety risks for individuals involved in sample collection, and includes procedures to be followed in the event of a safety incident.

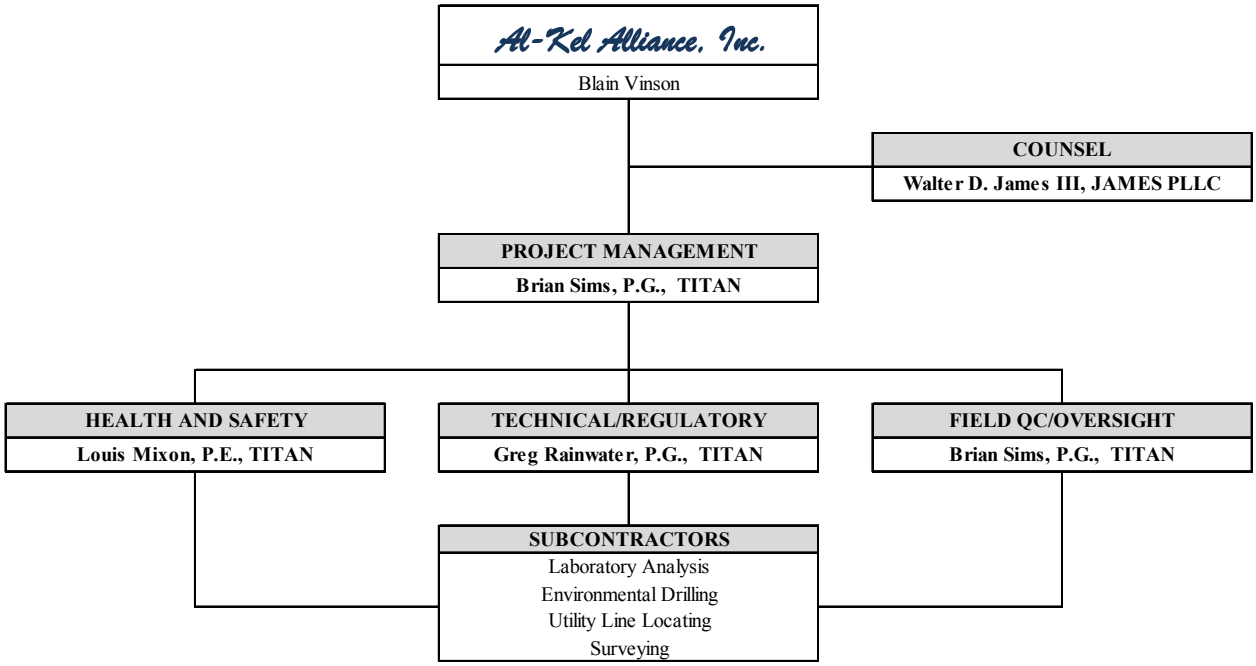
E. Schedule – A schedule for implementation of the Work Plan summarizes the tasks and associated times for completion.

Each of these components is included as an Appendix to the Work Plan. Please refer to these documents for details regarding the proposed environmental assessment of the Site.

4.0 PROJECT ORGANIZATION

The project organization for the environmental assessment is shown in Table 1. Contact information for key personnel is included in the Distribution List. Subcontractors will be retained for specialty services during the field effort to include environmental analytical services, environmental drilling services, buried utility line locating and surveying. Subcontractors will be licensed and/or certified to perform the required tasks, as appropriate.

Table 1. Project Organization



APPENDIX A

CONCEPTUAL SITE MODEL

APPENDIX A
CONCEPTUAL SITE MODEL

(Rev 0)

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Appendix A – Conceptual Site Model

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Figures

This CSM is a component of the Work Plan prepared in response to an UAO issued by EPA to Al-Kel on January 20, 2012. The CSM presents information regarding the environmental release, and transport and fate of potential COCs associated with the Al-Kel Site. As such, the CSM describes the sources, pathways and receptors of the release and serves as the basis for collection and evaluation of site-specific data to allow for evaluation of the potential risks associated with any release.

1.0 SITE DESCRIPTION

The Site is located at 2012 N. Goode Road in Wilmer, Dallas County, Texas, as shown on *Figure 1 – Site Location Map*. The Site encompasses approximately 11.5 acres (per Dallas County Central Appraisal District); however, only the northernmost 4.3 acres of the tract are utilized for Al-Kel operations as reported by Al-Kel personnel. The southern portion of the tract, outside of the fenced area, has been graded and cleared but has not been used for operations or storage. The Site was developed by Al-Kel in 2002, but was previously used for agricultural purposes (crop land) as shown in historical aerial photographs.

2.0 SITE OPERATIONAL HISTORY

Operations conducted at the Site by Al-Kel include servicing of industrial containers obtained from oil and gas, agricultural, paint, and semiconductor manufacturing facilities. The Site is registered and/or permitted with the following regulatory programs:

- RCRA Small Quality Generator (EPA ID TXR000043273)
- TCEQ Air New Source Permit (47794)
- TCEQ Industrial and Hazardous Waste/Solid Waste Registration (SWR 86817)
- Municipal Solid Waste Non Permitted (ID 100121)

Al-Kel's operations involve cleaning of frac tanks, tanker trailers, totes and drums. Some totes and drums are reconditioned and returned to service. Plastic totes that are not returned to service are destroyed through chipping. The chipped plastic is packaged and sold to off-site recycler.

In early 2012, Al-Kel began a phase-out program at the Site for tote maintenance and recycling. Currently, the primary operations conducted at the Site consist of tank cleaning.

Tote recycling activities historically conducted at the Site involved the following:

- plastic totes (generally 275 gallon capacity) were received at the Site from outside vendors and manufacturers;

- any residual chemicals or materials within the totes was physically removed and consolidated in a "deheeling" tote;
- empty totes were chipped; and,
- chipped plastic was packaged for marketing to outside recyclers.

Totes that were delivered to the Site for reconditioning or recycling were typically identified as "RCRA empty" by the generators; however, residual liquids remained in some totes.

Empty totes and drums delivered to the Site were stored on the ground surface, and drums were occasionally in trailers. Tote consolidation and recycling activities were conducted on the south side of the Site (southeast of the Al-Kel maintenance building). Drums and totes destined for recycling were placed along the eastern portion of the Site. Stainless steel asset totes, scheduled for cleaning and reconditioning, were also stored on the Site.

As previously discussed, consolidation of residual materials in the totes was accomplished by of emptying one tote into a designated consolidation or deheeling tote. This activity was conducted on the ground surface. Historically, the heel storage was located northwest of the office / tank cleaning building. The heel totes were eventually placed in 20 cubic yard roll-off containers and characterized for disposal. The roll-off containers were temporarily stored along the west side of the Site with a plastic underliner.

Tank cleaning operations are conducted within the tank cleaning/administration building, located in the center of the Site. This building was constructed with an engineered 30-mil liner beneath the slab. As such, the concrete slab and underliner are protective of the subsurface soils. Tanker trailers are maneuvered into the building for washing *via* four bays. Waste water generated during tank cleaning activities is discharged frac tanks located on the north side of the tank cleaning building. The wastewater is treated onsite until laboratory analyses demonstrate that wastewater quality meets local permit requirements and is batch-discharged under the permit to the City of Hutchins sanitary sewer.

3.0 INVESTIGATION HISTORY

As outlined in the UAO, allegations of environmental releases by Al-Kel were received by the TCEQ in 2005, 2009 and 2010 through complaints by various individuals. The complainants alleged that Al-Kel activities caused environmental impairment due to the following:

- releases of contaminants to the air, stormwater and surface soils;

- discharges of chemicals and rinse water to the ground surface from totes, drums and tanker trailers; and,
- leakage of substances and hazardous wastes (ammonia, polymers, acids) from totes and drums onto unpaved surfaces.

The TCEQ found no evidence of releases. Ammonia and polymers handled at the Site have been demonstrated to be non-hazardous through waste profile analyses.

During August 2011, EPA conducted a Site visit during which six drums were found in a storage trailer on the southeastern portion of the Site. Leakage from the drums onto the trailer floor was also observed by EPA. However, no samples of soil, groundwater, surface water or sediment have been collected for qualitative analyses to determine if potential COC concentrations exceed TRRP PCLs.

The regulatory investigation history has been focused on the management of contents stored, transferred and potentially released from tanks, drums and totes onto the ground surface; thus, the areas of the Site used for container management will be investigated in by Al-Kel in accordance with the UAO.

4.0 POTENTIAL LOCATIONS OF ENVIRONMENTAL RELEASES

Based on the activities conducted at the Site by the EPA and the TCEQ, complaints to the TCEQ and the observations made by EPA, environmental release(s) may have occurred in association with container management activities as summarized in Table 1.

Table 1. Description of Potential Environmental Releases

Operations	Site Location	Potential Release
Tote Consolidation / Deheeling	Eastern corner of the Maintenance Building	incidental ground surface spills during tote residual consolidation procedures
Heel Storage	Northwestern portion of the Site	incidental ground surface spills during filling, loading or storage in roll-off containers
Tote/Drum Storage Area	Eastern and southern portions of the Site	incidental ground surface spills from containers inadvertently tipped over or lacking structural integrity
Frac Tank Storage	Northern corner of the Truck Wash Building	incidental ground surface spills from storage/transfer of wastewater from frac tanks

5.0 SITE CHARACTERISTICS

5.1 Topography

The Site rests on a topographic ridge with a gentle slope from east to west (approximately 1%). The elevation at the corner of N. Goode Road and E. Wintergreen Road (northwestern corner of the Site) is approximately 464 feet above mean sea level.

5.2 Soils

The Site soils are classified as belonging to the Houston Black Clay and the Lewisville Silty Clay. The Houston Black Clay is situated along the western and northern portion of the active Site (70% of the active Site). The Lewisville Silty Clay is found on the southern portion of the Site (30% of the active Site). Both soil types exhibit low to moderately low permeabilities and are alkaline. The characteristics of these soil units are summarized in Table 2.

Table 2. Site Soil Characteristics[1]

Soil Classification	Depth (in)	Soil Type	Liquid Limit	Plasticity Index	pH
Houston Black Clay	0 to 6 6 to 52 52 to 78	Clay (CH) Clay (CH) Clay (CH)	58-90 58-98 51-99	34-60 37-72 32-78	7.4-8.4
Lewisville Silty Clay	0 to 17 17 to 52 52 to 75	Silty Clay (CH, CL) Silty Clay (CH, CL) Silty Clay (CH, CL)	41-61 40-60 30-55	20-37 24-36 12-34	7.9-8.4

5.3 Hydrogeology

The Site is underlain by the Austin Chalk Formation[2], as illustrated on *Figure 2 – Geologic Mapping*. The Austin Chalk consists of interbedded chalk and marl beds. The Austin Chalk contains trace amounts of pyrite and marcasite, which are ferrous sulfide minerals that are unstable in the presence of oxygen. Siderite, an iron carbonate may also be present. Weathering occurs as meteoric water (rainfall and surface water) infiltrates the bedrock oxidizing the iron in the sulfide and carbonate minerals and dissolving the calcium carbonate of the Austin Chalk. Ferrous iron is converted to ferric iron, turning the bedrock a tan color.

The Austin Chalk is typically weathered to a depth of 10 to 15 feet, except where meteoric waters penetrate deeper in fractures and marl beds. Fractures are typically sub-

[1] US Soil Conservation Service, 1980. *Soil Survey of Dallas County, Texas.*
[2] Bureau of Economic Geology, 1972. *Geologic Atlas of Texas, Dallas Sheet.*

vertical within the upper 30 feet of bedrock, becoming increasingly horizontal until terminating in marl beds at depths shallower than about 50 feet. Tan "halos" form around the fractures and more permeable marl beds as oxygen diffuses from infiltrating meteoric water. The permeability within a fracture zone increases as weathering progresses. However, the weathering process is limited due to the overall low permeability of the Austin Chalk.

The permeability of primary porosity within the chalk beds of the Austin Chalk is very low – on the order of $1x10^{-7}$ cm/sec. The permeability of the primary porosity within the marl beds of the Austin Chalk is approximately $1x10^{-5}$ cm/sec. Where environmental releases affect the chalk, the contaminants typically reside within the more permeable secondary porosity features such as fractures (natural) and utility conduits (manmade), although diffusion and limited advection does occur within the primary porosity.

The Site is located where the uppermost portion of the Austin Chalk encounters the leading edge of the Ozan Formation. Locally, alluvial material associated with the Trinity River is deposited approximately 4,000 feet east of the site.

The assumed groundwater gradient beneath the Site is towards the east, consistent with the topographic slope and towards the Trinity River. No substantial manmade features are located on the Site that would collect or influence groundwater flow such as stormwater retention/detention ponds.

5.4 Hydrology

Surface water is discharged from the Site by sheet flow towards the west and east where the discharge enters drainage ditches along N. Goode Road and E. Wintergreen Road, respectively. The road ditches route stormwater to Lancaster Lake located 1.0 miles northeast of the Site. The lake is constructed with a spillway that overflows to the adjacent Trinity River.

6.0 POTENTIAL EXPOSURE PATHWAYS AND RECEPTORS

The most probable human receptors affected by any releases of COCs from container management operations or incidental spills are Site workers. Worker exposure may occur through:

- Ingestion of soil (acute exposure),
- Inhalation of fugitive dust (acute exposure), and;
- Dermal contact with soil (acute exposure).

The total soil combined ($^{Tot}Soil_{Comb}$) PCLs have been established by TCEQ to allow for the evaluation of COCs in soil related to the aforementioned exposure pathways.

An additional human receptor that could be affected by a release of COCs from the Site is a water well user whereby dermal contact or ingestion of affected groundwater could occur. However, no water wells were identified in TCEQ records within the immediate vicinity of the Site .

Human exposure to sediments does not occur at the Site because no surface water bodies (or associated sediments) are located on or adjacent to the Site. Roadway drainage ditches are dry except during storm events and, therefore, are lined with soil as opposed to sediment.

Surface water run-off consists of sheet flow to drainage ditches along N. Goode Road and E. Winter Green Road. An environmental release associated with any small, incidental spills in tote storage and management areas would likely sorb to surface soils and would not affect stormwater quality. No evidence of a release or imminent threat of release to surface water has been identified at the Site.

No evidence of affected ecological receptors has been identified in association with any incidental releases from the Site. The Site is covered with crushed aggregate and buildings and does not serve as a valuable habitat, foraging area or refuge for ecological communities. Likewise, properties located adjacent to the Site are developed with parking areas and buildings, or are cleared and graded but undeveloped. The Site is located approximately The properties located in the immediate vicinity of the Site are not valuable ecological habitats.

7.0 PROPOSED SAMPLING PLAN

Based on an evaluation of Site operations, areas of possible releases, and potential exposure pathways and receptors, the medium most likely affected in association with incidental spills onto the ground surface from container management is soil. Thus, surface and subsurface soil will initially be investigated to determine if an environmental release has occurred whereby COC concentrations exceed applicable PCLs.

The initial soil investigation will be focused at potential contaminant source areas. The results of the initial soil investigation will be evaluated to determine if COCs exist in soil at concentrations above applicable PCLs. If $^{Tot}Soil_{Comb}$ PCLs are exceeded, then additional soil assessment activities will be conducted to allow for delineation of COCs in soil. Additionally, if applicable soil-to-groundwater PCLs are exceeded, then an investigation of groundwater will be conducted. Implementation of the additional soil and groundwater investigations will be contingent upon the result of initial potential source-area soil investigation.

Thus, a phased approach will be implemented to assess the Site whereby soil will initially be evaluated for potential COCs. If no surface soils are affected at concentrations exceeding applicableTRRP PCLs and assessment findings can be used to demonstrate that groundwater is not likely affected, then the environmental assessment of the Site will conclude with a soils-only investigation.

No sampling of surface water or sediment will be conducted on the Site since these environmental media are not present.

The proposed sampling activities for soil and groundwater (if warranted) are summarized below. Procedures for sampling are detailed in *Appendix B – Sampling and Analysis Plan*.

7.1 Surface and Subsurface Soil

Six borings will be advanced at potential contaminant source areas soil sampling purposes as follows:

- Boring #1 – tote consolidation/deheeling area
- Borings #2 – heel storage area
- Borings #3, #4 and #5 – tote/drum storage areas
- Boring #6 – frac tank storage area

The proposed boring locations are shown on *Figure 3 – Proposed Sampling Locations*. During drilling, the soil will be logged and screened with a photoionization detector ("PID"). The six borings will be advanced to a depth of ten feet or until weathered bedrock (Austin Chalk) is encountered, whichever is shallower.

Soil samples will be collected in the unsaturated zone for laboratory analyses. Up to three soil samples will be collected from each soil boring for laboratory analyses. Additional discussion regarding the methods for sample collection is presented in *Appendix B – Sampling and Analysis Plan.*

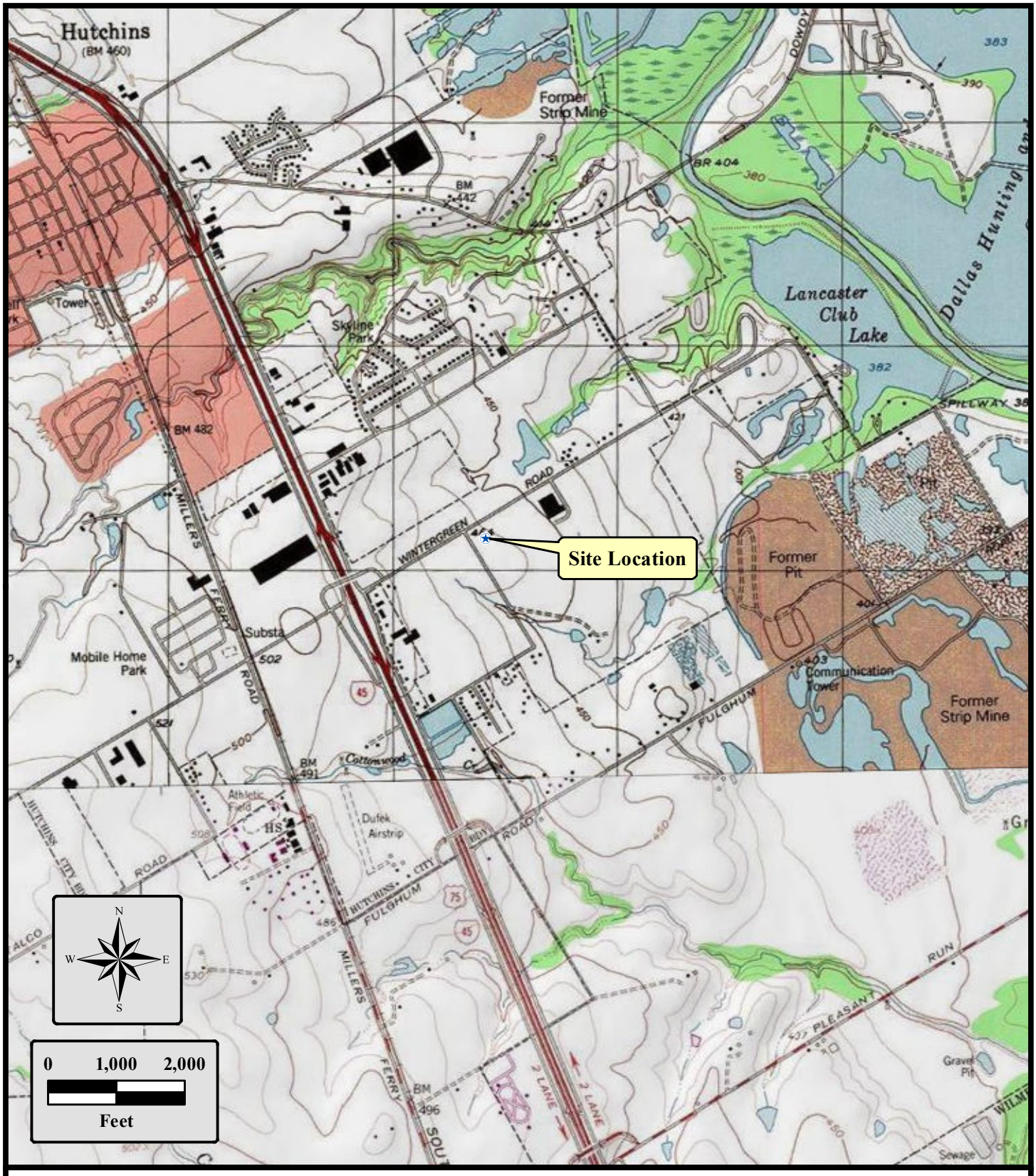
Soil samples will be analyzed for various organic and inorganic parameters. The laboratory analyses and reporting will be completed in accordance with TRRP guidelines. Analysis and evaluation of the soil samples is presented in *Appendix C – Quality Assurance Project Plan.*

7.2 Groundwater

Following the completion of soil assessment activities and if a determination that potential impacts to groundwater have occurred, groundwater samples will be collected

from the Site for laboratory analyses. Groundwater samples will be collected using direct-push technology . The groundwater sampling points will be located adjacent to soil borings from which soil samples exhibited constituent concentrations exceeding an applicable soil-to-groundwater PCL(s). During direct-push advancement of sampling equipment, the soil will be logged and screened with a PID for potential volatile compounds; however, no additional soil samples will be collected for laboratory analyses. Additional discussion as it relates to groundwater sampling is presented in *Appendix B - Sampling and Analysis Plan*. Analysis and evaluation of the soil samples is presented in *Appendix C – Quality Assurance Project Plan*.

FIGURES



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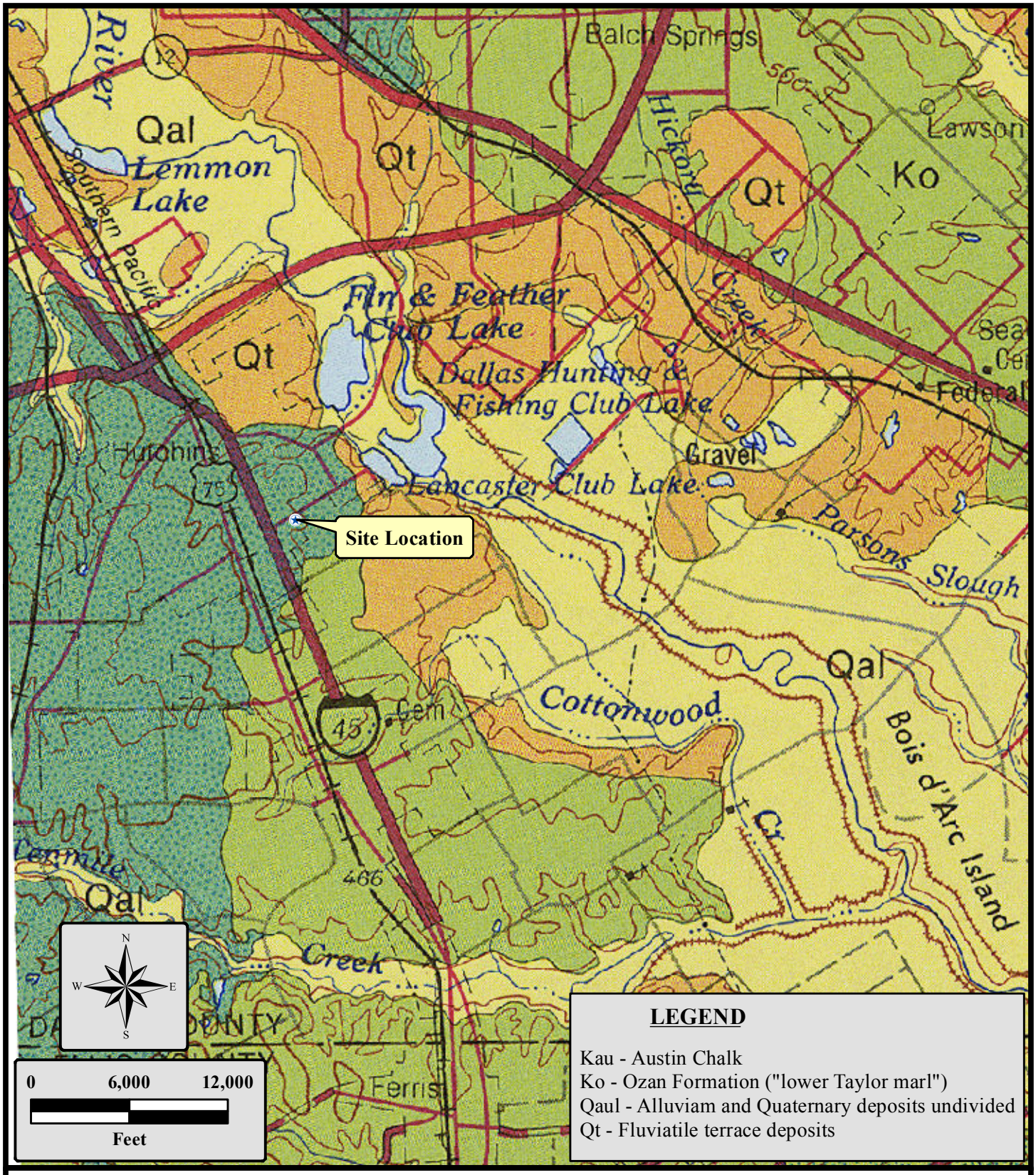
SITE LOCATION MAP
Al-Kel Alliance, Inc.
2012 North Goode Road
Wilmer, Texas
TITAN Project No. 84800583-01
March 2012

from USGS Quadrangle, Hutchins, Texas.
Digital Data Courtesy of ESRI Online



LEGEND

Kau - Austin Chalk
Ko - Ozan Formation ("lower Taylor marl")
Qaul - Alluviam and Quaternary deposits undivided
Qt - Fluviatile terrace deposits

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GEOLOGIC MAPPING
Al-Kel Alliance, Inc,
2012 N. Goode Road
Wilmer, Texas
TITAN Project No. 84800583-01
March 2012

from Bureau of Economic Geology, Geologic Atlas of Texas, Dallas Sheet, Revised 1987

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FIGURE 3
PROPOSED SAMPLING LOCATIONS

AL-KEL ALLIANCE, INC.
2102 NORTH GOODE ROAD
WILMER, TEXAS

DESIGNED BY:	DETAILED BY:	CHECKED BY:
TEI	BS	BS
FILE NAME: T:\Al-Kel\4.2...\Fig3-Proposed Locations.dwg		
DATE: 03/12/12	PROJECT NO.: 583-01	PLOT SCALE: 1" = 150'
DRAWING NO.: TEI-0000	REVISION: 0	FIGURE: **3**

APPENDIX B

SAMPLING AND ANALYSIS PLAN

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Appendix B – Sampling and Analysis Plan

Tables

1.0 INTRODUCTION

This SAP is a component of the Work Plan prepared in response to an UAO issued by EPA to Al-Kel on January 20, 2012. The SAP outlines field sampling and analyses procedures to guide field personnel during collection of environmental media. The SAP supplements the QAPP that is also a component of the Work Plan.

1.1 Statement of Objectives

The objective of this SAP is to describe the following:

- Sample collection and custody procedures;
- Equipment and procedures to be used for sampling;
- Methods for laboratory analyses of samples; and,
- Data quality objectives.

2.0 OVERALL SAMPLING APPROACH

2.1 Sample and Analysis Summary

The assessment of the Site will be conducted using a phased approach whereby surface and subsurface soil will initially be investigated for potential COCs. Soil borings will be advanced at locations considered to be potential contaminant source areas described in the CSM and summarized in Table 1.

Table 1. Potential Contaminant Source Areas

Boring No.	Operations	Site Location	Potential Release
1	Tote Consolidation / Deheeling	Eastern corner of the Maintenance Building	incidental ground surface spills during tote residual consolidation procedures
2	Heel Storage	Northwestern portion of the Site	incidental ground surface spills during filling, loading or storage in roll-off containers
3/4/5	Tote/Drum Storage Area	Eastern and southern portions of the Site	incidental ground surface spills from containers inadvertently tipped over or lacking structural integrity
6	Frac Tank Storage	Northern corner of the Truck Wash Building	incidental ground surface spills from storage/transfer of wastewater from frac tanks

Since a variety of chemicals have been handled at the Site, the soil sample analyses will be comprehensive to allow for the identification of potential COCs.

If the analytical data from the source-area soil assessment indicates that COC concentrations exceed the applicable TRRP PCLs such that groundwater is potentially impacted, then groundwater will be investigated for the COCs identified during the initial soil investigation. If warranted, groundwater samples will be collected using direct-push methods and equipment. The groundwater sampling locations will be strategically placed to assess potential source areas based on the findings of the initial soil investigation.

The direction of groundwater flow in the uppermost groundwater bearing unit is assumed to be towards the east as discussed in the CSM. Field water quality parameters will be collected concurrent with the collection of groundwater samples for laboratory analyses. The results of groundwater sample analyses will be compared to TRRP PCLs.

2.2 Field Sampling Documentation

Field logs will be used to record sampling activities on a daily basis. Each logbook will be bound and have consecutively numbered pages. Entries in the field logbook will be made in waterproof ink and will include:

- Name of the author;
- Date and time of entry;
- Daily weather report;
- Location of activity (including diagrams or maps);
- Sample collection or measurement methods;
- Number of samples collected;
- Sample identification numbers;
- Field observations and comments;
- Sampling depth increments;
- Field measurement;
- Locations of photographs;
- Signature of individual(s) performing sampling activities; and,
- Any deviations from the SAP.

All logbooks will be maintained and in possession of the field team while onsite. Upon project completion, the logbooks will become part of the file records.

3.0 SAMPLING EQUIPMENT AND PROCEDURES

3.1 General Sampling Procedures

In general, the following sampling procedures will be implemented for assessment activities:

- Sampling and field activities will be conducted as detailed in the SAP.
- Sampling, analytical and QA/QC procedures will be performed in accordance with the QAPP; and
- The sampling team will adhere to the HASP requirements.

The following equipment, tools and supplies will be available for use during sampling:

- Field Logbook;
- Plastic or glass laboratory-supplied sample containers;
- Stainless steel or plastic disposable trowels;
- Stainless steel hand auger with extension sections;
- Direct-push rig or hollow stem auger rig,
- Zip-Lock® bag or equivalent sample bags;
- Measuring tape;
- Distilled water, low-phosphate detergent, and brushes;
- Disposable gloves;
- Trash bags; and,
- 5-gallon buckets to carry equipment and for decontamination liquids.

- All reusable sampling equipment will be decontaminated utilizing a non-phosphate detergent wash and potable water rinse, followed by a distilled water rinse. All disposable sampling media will be placed into designated containers for disposal.

3.2 Drilling and Soil Sampling Procedures

3.2.1 Soil Boring Installation and Sampling Activities

- Six borings will be advanced at the potential contaminant source areas as illustrated on *Figure 3 – Proposed Sampling Locations*. A truck-mounted drilling rig equipped with hollow-stem augers ("HSA") and 5-foot (length) split-barrel samplers will be utilized for the advancement of the soil borings. During drilling, the soil will be logged and screened with a photoionization detector ("PID") calibrated to a 100 part per million volume ("ppmv") isobutylene standard. The PID readings will be used to facilitate soil sample collection where volatile organic compounds are detected. Soil samples will be collected following strict chain-of-custody ("CoC") protocol.

The borings will be advanced to a depth of ten feet or until weathered bedrock (Austin Chalk) is encountered, whichever is shallower. Samples will be collected from the unsaturated zone at the following depth intervals for laboratory analyses:

(1) 0-1 foot depth interval (based on the potential for releases to have occurred at the ground surface);

(2) below a depth of 1 foot where the highest PID readings are obtained, or soil staining or other field evidence of environmental impacts is identified. The sample will be collected over a one-foot depth interval. If no field evidence of impacts to soil in the unsaturated zone is detected, soil will be collected from a depth of 4-5 feet.

(3) directly above the capillary zone or, if bedrock is encountered prior to the capillary zone, from the soil-bedrock interface. The sample will be collected over a one-foot depth interval.

Soil samples will be placed in laboratory-supplied glassware immediately following examination to determine the sampled interval(s) for collection. Sample containers will be labeled and stored in a chilled cooler at a temperature of 4°C ± 2°C. Soil samples will be collected in appropriate laboratory-provided containers as indicated in *Table 2. Lab Analytical Methods - Soil*

3.2.2 Decontamination and Disposal Activities

All downhole drilling equipment and sampling tools will be decontaminated via high-pressure water or Alconox® wash, followed by a potable/distilled water rinse. At a minimum, decontamination will be conducted prior to work at each location and sampling interval, and more frequently as field conditions dictate. All decontamination water will be placed in 55-gallon drums and staged at the facility. Proper disposal will occur once sufficient analytical data is available to profile the waste.

3.3 Groundwater Sampling Procedures

As previously discussed, groundwater sampling is a contingency sampling task that will be performed if the analytical data from the potential contaminant source-area soil assessment indicates that COC concentrations exceed the applicable soil-to-groundwater PCLs. If investigated, groundwater samples will be analyzed for COCs exceeding the soil-to-groundwater PCLs determined during the soil investigation. The procedures for groundwater sampling are provided below in the event that contingency groundwater sampling is warranted.

3.3.1 Groundwater Sampling Point Installation

Groundwater samples will be collected by installing a temporary well screen using a direct-push method. The well screen may consist of a sampling device driven through the interior of the direct-push rods (e.g., Hydropunch II™), or a constructed well screen lowered through the rods. The equipment used to facilitate groundwater sampling will be determined based on field conditions including the availability of shallow groundwater, groundwater recharge, and subsurface lithologies. Low-permeable and consolidated formations such as those typically associated with the weathered Austin Chalk are less conducive to sampling with a driven well screen. Groundwater samples collected using

either a driven or constructed well screen will produce comparable analytical results.

If a driven temporary well screen is used for groundwater sampling, the well screen will be installed as follows:

- Direct-push rods will be driven to approximately three feet into the uppermost GWBU;
- The static water level will be measured with an electronic water level indicator in relation to the ground surface;
- The sampling screen according to the manufacturer's instructions and the screen will be lowered to the bottom of the drill rods;
- The sampling screen will be driven into undisturbed materials below the drill rods. The drill roads will then be withdrawn to expose the screen of the sampling device in accordance with the manufacturer's instructions.

If a constructed well screen is used for groundwater sampling, the well screen will be installed as follows:

- Direct-push rods will be driven to at least five feet into the uppermost GWBU;
- Well screen consisting of 1-inch diameter PVC will be lowered through the drill rods. Alternatively, the drill rods may be removed and the PVC well screen lowered through the open borehole if subsurface lithologies do not slough such that the borehole collapses;
- A sand filterpack will be installed through the borehole or will be pre-wrapped on the well screen to facilitate collection of a sediment-free groundwater sample;
- The static water level will be measured with an electronic water level indicator in relation to the ground surface;
- The sampling screen will be driven into undisturbed materials below the drill rods. The drill roads will then be withdrawn to expose the screen of the sampling device in accordance with the manufacturer's instructions.

Both driven and constructed well screen materials will be disposal after use and dedicated to only one sampling location. Sampling screens will be removed and the boring plugged with bentonite following collection of groundwater samples.

3.3.2 Groundwater Sampling

Groundwater samples will be collected through the installed temporary well screens. Sampling will be accomplished using either a stainless steel or disposable polyethylene

bailer, or a peristaltic pump with downhole disposable polyethylene tubing. A peristaltic pump will be used as the equipment of choice for groundwater sampling. However, if groundwater recharge is slow such that the well screen is evacuated quickly, then bailers will be used for groundwater sample collection.

The peristaltic pump with polyethylene tubing dedicated to each well screen and a flow through cell will be employed for purging and sampling activities. A pumping rate of approximately 0.1 liters per minute will be maintained during the purging process. Water quality parameters including temperature, specific conductivity, pH, dissolved oxygen and oxidation-reduction potential will be monitored with an YSI-556 water quality instrument every three minutes until stable conditions were achieved for three successive measurements, whereupon a sample will be collected. Prior to collecting the sample, the flow cell will be disconnected. Stabilization limits are ± 0.1 for pH, ± 3% for conductivity, ± 10% for dissolved oxygen and ± 10mv for oxidation reduction potential.[1]

If a bailer is used to sample the groundwater, the bailer will be slowly lowered into and withdraw from the well screen to inhibit the suspension of solids. Groundwater samples will then be emptied into sample containers with the appropriate preservatives. This process will continue until sample containers are filled. Field groundwater quality parameters will be collected at the conclusion of groundwater sampling at each sampling point. If a stainless steel bailer is used, the bailer will be cleaned between each groundwater sampling location with a non-phosphate detergent wash and distilled water rinse.

If groundwater samples exhibit excessive turbidity (>10 NTU), samples collected for metals analysis will be filtered in the field using a 10 micron filter. Filters will be dedicated to each groundwater sample.

Groundwater samples will be collected in appropriate laboratory-provided containers as indicated in *Table 3. Lab Analytical Methods - Groundwater*. The containers are immediately sealed, labeled, and placed on wet ice in insulated coolers. The groundwater samples will be shipped via overnight delivery to the NLAC approved laboratory, following strict CoC procedures.

[1] EPA, April 1996. *Low-Flow (Minimal drawdown) Ground-Water Sampling Procedures* EPA/540/S-95/504.

3.4 Investigation Derived Waste Handling

Investigation derived waste ("IDW") will be generated and collected during the field activities. IDW will include soil cuttings generated during drilling activities, rinsate from decontamination of drilling equipment and sampling equipment, and groundwater generated during well screen sampling activities. All IDW will be placed in DOT-approved 55-gallon drums for temporary storage at the Site. The drums will be labeled to indicate the date of collection and contents.

Samples of IDW will be collected for waste characterization purposes. If COCs are detected in any IDW stream, then the IDW will be disposed of in accordance with regulatory requirement and Al-Kel protocols. If IDW is determined not to be impacted, then the collected materials may be handled through on-site discharge or other appropriate means.

4.0 ANALYTICAL METHODS

4.1 Laboratory Analysis - Soil

Laboratory analytical methods used for soil samples collected during the assessment activities are listed in Table 2.

Table 2. Laboratory Analytical Methods - Soil

Sample Type	Parameter	Container/Preservative	Test Method
Soil	VOCs	4 oz glass / 4°C	SW-846 Method 8260
	PAH	4 oz glass / 4°C	SW-846 Method 8270
	TPH	4 oz glass / 4°C	TX 1005
	RCRA Metals	4 oz glass / 4°C	SW-846 Method 6010B and 7000
	pH	4 oz glass / 4°C	SW-846 Method 9045

Soil samples collected from all depth intervals will be analyzed for VOC and TPH since these COCs are the most likely to have impacted soil through incidental spillage from frac tanks, totes and drums. Samples collected from the upper and intermediate depth intervals will also be analyzed for RCRA metals and pH.

The results of TPH will be used as an indicator of petroleum hydrocarbon impacts. As such, samples exhibiting TPH >C12 concentrations above 50 mg/kg will also be analyzed for PAH to allow for speciation of semivolatile organic compounds. This approach for selecting soil samples for PAH analysis is consistent with TCEQ's petroleum storage tank guidance.

4.2 Laboratory Analysis - Groundwater

If contingency groundwater sampling is warranted based on the analytical results of soil samples, groundwater samples will be analyzed for only those constituents whereby potential soil-to-groundwater impacts is identified. Groundwater samples may be analyzed for any of the parameters listed in Table 3.

Table 3. Laboratory Analytical Methods - Groundwater

Sample Type	Parameter	Container/Preservative	Test Method
Groundwater	VOCs	40 ml VOA / 4°C, HCl	SW-846 Method 8260
	PAH	1L Glass Amber / 4°C, H^2SO^4	SW-846 Method 8270
	TPH	40 ml VOA / 4°C, HCl	TX 1005
	RCRA Metals	0.5L Plastic / 4°C, HNO^3	SW-846 Method 6010B and 7000

4.3 Laboratory Turnaround Times

Laboratory turnaround times ("TAT") will vary with the data requirements. A standard TAT of 10 working days will be routine, with occasional requirements for more expedited turnaround times.

5.0 DATA QUALITY OBJECTIVES

5.1 Duplicates and Blanks

Rinsate blanks and field duplicates will be collected at a one per day interval for field QA/QC, as well as laboratory QA/QC for all samples submitted to the laboratory. The laboratory QA/QC will include one MS/MSD for every 20 samples. A complete description of all QA/QC procedures is presented in the QAPP provided as Appendix C of the Site Assessment Work Plan.

5.2 Detection Limit Requirements

It is necessary that data quality objectives be consistent with TRRP residential assessment levels ("RAL"). Therefore, analytical detection limits will be less than the RAL for each COC and will be selected so that any analyzed parameter result can be compared to the appropriate level. The QAPP discusses the planned detection limits for analyses along with the methods to be used for this investigation in order to address the various levels for comparison.

5.3 Chain-of-Custody Procedures

Proper documentation of sample collection and the methods used to control these documents are referred to as CoC procedures. CoC procedures are essential for

presentation of sample analytical results as evidence in litigation or at administrative hearings conducted by regulatory agencies. CoC procedures also serve to minimize loss or misidentification of samples and to ensure that unauthorized persons do not tamper with collected samples. The CoC procedures are described in the QAPP.

5.4 Sample Shipping

For shipping, all laboratory samples will be stored on ice and packaged in such a manner as to prevent damage or breakage during shipment or transport. Samples not hand delivered to the laboratory will be shipped through an overnight parcel service by sampling personnel. Samples will be placed into suitable containers, labeled and sealed in such a manner that tampering with the seal would be obvious. All sample holding times will be tracked and a copy of the CoC form will accompany the samples in a sealed plastic bag. Sample shipping is discussed in the QAPP.

APPENDIX C

QUALITY ASSURANCE PROJECT PLAN

APPENDIX C
QUALITY ASSURANCE PROJECT PLAN
(Rev 0)

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Appendix C – Quality Assurance Project Plan

1.0 INTRODUCTION

This QAPP This CSM is a component of the Work Plan prepared in response to a UAO issued by EPA to Al-Kel on January 20, 2012. This QAPP provides quality assurance/quality control ("QA/QC") procedures for activities conducted during environmental assessment activities to be performed at the Site.

The UAO requires a QAPP to be developed for all sampling and analysis conducted under the UAO. To meet this requirement, this QAPP has been prepared detailing QA/QC procedures to ensure data generated during the subsurface activities are accurate, precise, comparable, and complete and therefore, representative of conditions on the Site.

This QAPP will serve as a controlling mechanism during the performance of the sampling and analysis activities to detail procedures to ensure that technical data gathered during the assessment are accurate, precise, complete, and representative of actual field conditions and meet minimum requirements of the approved design documents. All QA/QC procedures will be structured in accordance with applicable technical standards, USEPA requirements, and regulations in general accordance with USEPA *Requirements for Quality Assurance Project Plans EPA QA/R-5* dated March 2001 and *Guidance for Quality Assurance Project Plans EPA QA/G-5* dated December 2002.

1.1 Project Organization

The following sections describe the lines of authority of the Project Management Team for overseeing and implementing the assessment activities at the Site. The assigned management team may change. If a change in the management team personnel occurs, the modification will be communicated to the EPA.

1.1.1 Project Oversight Team

The oversight team provides the management and coordination, which includes technical support and interpretation, review and approval of project submittals and changes and QA/QC, for all work performed by the remedial contractor.

1.1.1.1 USEPA Region 6 Project Manager

The USEPA Region 6 Regulatory Project Coordinator ("RPC") has overall responsibility for all phases of the assessment with respect to review and approval of submittals. Mr. Bill Mansfield will serve as the RPC for the project.

1.1.1.2 Al-Kel Alliance, Inc.

Al-Kel is responsible for the overall implementation of assessment activities for the Site. Mr. Blain Vinson will serve as the representative of Al-Kel. Mr. Walter D. James III of James PLLC is Counsel for Al-Kel.

1.1.1.3 Project Manager

The Project Manager ("PM") will ensure proper coordination and communication among the various project stakeholders. These stakeholders include the EPA and Al-Kel. The PM will be responsible for administration of all the Respondents actions required under the Order. To the greatest extent possible, the PM will be readily available during work at the Site. Mr. Brian Sims of TITAN will serve as the PM on behalf of Al-Kel.

1.1.1.4 Quality Control Manager

The Quality Control Manager ("QCM") will ensure that the work is performed in accordance with the Work Plan and all local, state and federal regulations. The QCM will oversee and review all quality control data collected in the field, as well as provide support as necessary. Mr. Greg Rainwater of TITAN will serve as the QCM on behalf of Al-Kel.

1.1.1.5 Health and Safety Coordinator

The Health and Safety Coordinator ("HSC") will coordinate and provide oversight for the health and safety issues associated with the assessment activities. The HSC will be responsible for preparing the HASP and conducting the health and safety orientation meeting prior to implementing site activities. The HSC will also oversee field health and safety operations. Mr. Louis Mixon of TITAN will serve as the HSC on behalf of Al-Kel.

1.1.1.6 Quality Assurance/Quality Control Officer

The QA/QC Officer will be responsible for performing the required sampling and quality control testing during the remedial activities and will ensure that the work is performed in accordance with the specifications set forth by the construction documents, work plans and regulations. The QA/QC Officer will have the authority to correct and implement additional measures to assure compliance with these documents. Mr. Greg Rainwater of TITAN will serve as the QCM on behalf of Al-Kel.

1.1.2 Laboratory Responsibilities

The laboratory will be responsible for properly analyzing all laboratory samples collected as part of the assessment activities. The designated analytical laboratory performing the analytical testing will have all required certifications and accreditations for performing analytical services under both federal and the state of Texas programs.

1.1.2.1 Laboratory Project Manager

The Laboratory Project Manager ("LPM") will report directly to the QA/QC Officer and will be responsible for ensuring that all resources of the laboratory are available as required. The LPM will also be responsible for the overview of the final analytical

reports. The LPM will be identified by the laboratory contracted to provide analytical services for the project.

1.1.2.2 Laboratory Quality Assurance Officer

The Laboratory Quality Assurance Officer ("LQAO") will be appointed by the LPM. The LQAO will have the overall responsibility for data generated by the laboratory. The LQAO will communicate data issues through the LQM. In addition, the LQAO will review laboratory QA/QC documentation, conduct detailed data review, determine whether to implement corrective action, and define appropriate laboratory procedures. The LQAO will be identified by the laboratory contracted to provide analytical services for the project.

1.1.2.3 Laboratory Sample Custodian

The Laboratory Sample Custodian ("LSC") will be appointed by the LPM. The LSC's responsibilities will include the following: receiving, recording and inspecting the incoming samples; verifying the CoC and checking for accuracy; notifying the LPM and supervisor of sample receipt and inspection details; assigning unique identification numbers to incoming samples and entering each number into the sample receiving log; and transferring samples to the appropriate laboratory section. The LSC will be identified by the laboratory contracted to provide analytical services for the project.

1.1.2.4 Laboratory Technical Staff

The Laboratory Technical Staff will be responsible for performing the required sample analysis within required holding times and requested TAT.

1.2 Quality Objectives and Criteria for Measurement Data

The purpose of the sampling defined in the Work Plan and covered under this QAPP is to identify source areas with COC concentrations that exceed the appropriate PCLs.

Laboratory data will be high quality sampling data with fully approved QA/QC procedures and review. High quality data will meet the following criteria:

- Consistency with the DQOs for the current activities;
- Existence of laboratory data packages to support constituent calibration and data reporting procedures;
- Adherence to proper sampling holding times and CoC protocol; and,
- Application of constituent detection limits/reporting limits that exhibit appropriate sensitivity for current needs.

The overall QA objective for this project is to develop and implement procedures for field sampling, CoC protocol, laboratory analyses, and reporting that will provide results

that are legally defensible in a court of law. The purpose of implementing these procedures is to assess the data for precision, accuracy, representativeness, comparability, and completeness ("PARCC") objectives under both the laboratory analytical program and field sample collection activities. The primary goal of the program is to ensure that the data generated are representative of environmental conditions at the parcels to be addressed. To achieve this goal, a combination of statistical procedures and qualitative evaluations will be used to check the quality of the data.

PARCC will be computed in the manner described in the following paragraphs. A qualitative assessment of PARCC factors will be made and will be documented. Specific procedures for sampling, CoC, laboratory instrument calibration, laboratory analysis, reporting of data, internal QC, audits, preventative maintenance of field equipment, and corrective action are described in other sections of this QAPP.

Provided below are the minimum procedures used for meeting the PARCC objectives:

1.2.1 Precision

The precision of laboratory results and field sampling efforts will be evaluated by examining laboratory and field QC sample results. Analytical precision will be evaluated for analytical methods by comparing the QC criteria stipulated in the SOPs to the results from laboratory matrix spike/matrix spike duplicate ("MS/MSD") samples and field duplicate samples.

1.2.1.1 Definition

Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions, usually expressed in terms of the standard deviation.

1.2.1.2 Field Precision Objectives

Field precision is assessed through the collection and measurement of field duplicates at a rate of 1 duplicate per 20 analytical samples submitted to the laboratory.

1.2.1.3 Laboratory Precision Objectives

Precision in the laboratory is assessed through the calculation of relative percent differences ("RPD") for replicate samples collected as MS/MSD samples. Spiked samples are prepared by choosing a sample at random from each sample shipment received at the laboratory, dividing the sample into equal aliquots, and then spiking each of the aliquots with a known analyte concentration. The duplicate samples are then included in the analytical sample set. The splitting of the sample allows the analyst to determine the precision of the preparation and analytical techniques associated with the duplicate sample. The RPD between the spike and duplicate spike are calculated and plotted. The RPD is calculated according to the following formula:

$$\mathbf{RPD = \frac{(Amount\ in\ Spike\ 1 - Amount\ in\ Spike\ 2)}{0.5\ (Amount\ in\ Spike\ 1 + Amount\ in\ Spike\ 2)} \times 100}$$

Precision control limits are found in the laboratory quality assurance manual ("QAM").

1.2.2 Accuracy

The accuracy of the analytical data will be assessed by examining the results obtained from the analysis of duplicate samples, laboratory MS/MSD samples and equipment field blank samples. One duplicate sample will be collected for every 10 analytical samples. One MS and one MSD will be analyzed for every 20 analytical samples. One equipment field blank sample will be prepared for every day of sampling or every 10 analytical samples, whichever is greater. Field blanks will only be collected if re-usable sampling equipment is used to verify that decontamination procedures are adequate and not biasing data.

Data will be qualified in accordance with the appropriate EPA functional guidelines for evaluating data if either field QC blanks or laboratory QC blanks indicate that the accuracy or precision of analytical results is compromised.

1.2.2.1 Definition

Accuracy is the degree of agreement of a measurement with an accepted reference or true value.

1.2.2.2 Field Accuracy Objectives

Accuracy in the field is assessed through the use of field duplicates and blanks and adherence to all sample handling, preservation, and holding times.

1.2.2.3 Laboratory Accuracy Objectives

Laboratory accuracy is assessed through the analysis of MS or SRM and the determination of percent recoveries. In order to assure the accuracy of the analytical procedures, an environmental sample is randomly selected from each sample shipment received at the laboratory, and spiked with a known amount of the analyte to be evaluated. In general, a sample spike should be included in every set of 20 samples tested on each instrument or within a preparation batch. The spike sample is then analyzed. The increase in concentration of the analyte observed in the spiked sample, due to the addition of a known quantity of the analyte, compared to the reported value of the same analyte in the un-spiked sample determines the percent recovery. The percent recovery for a spiked sample is calculated according to the following formula:

$$\%\text{Recovery} = \frac{\text{(Amount in Spiked Sample – Amount in Sample)}}{\text{Known Amount Added}} \times 100$$

Accuracy control limits are found in the laboratory QAM.

1.3.3 Completeness

1.3.3.1 Definition

Completeness is the amount of valid data obtained from a measurement system compared to the amount that was expected and required to meet the project data goals.

1.3.3.2 Field Completeness Objectives

Field completeness is the measurement of the amount of valid measurements obtained from all the measurements taken during the project. The intent of this program is to attempt to achieve a goal of 100 percent completeness. Realizing that under normal conditions this goal may not be achievable, the completeness goal for this program is 90 percent. This completeness goal is considered adequate to meet the DQOs for the assessment based on prior consideration of PARCC parameters, the sampling plans, and data collection activities proposed for each medium. In developing the sampling design plan, critical data points were carefully considered and identified to help ensure comparability of data.

1.3.3.3 Laboratory Completeness Objectives

Laboratory completeness is a measure of the amount of valid measurements obtained from all the measurements taken during the project. The intent of this program is to attempt to achieve a goal of 100 percent completeness. Realizing that under normal conditions this goal may not be achievable, the completeness goal for this program is 90 percent.

Completeness is the ratio of the number of valid sample results to the total number of samples analyzed with a specific matrix and/or analysis. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Completeness} = \frac{\text{(Number of Valid Measurements)}}{\text{(Number of Measurements Planned)}} \times 100$$

1.3.4 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent environmental conditions and parameter variations at a sampling location.

Representativeness is a qualitative parameter most concerned with the proper design of the sampling program. Assuring that sampling locations are properly selected and a sufficient number of investigative samples are collected best satisfies the representativeness criterion.

1.3.4.1 Definition

Representativeness is the selection of analytical methods and sampling protocols and locations such that results are representative of the media being sampled and conditions being measured.

1.3.4.2 Measures to Ensure Representativeness of Field Data

Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that proper sampling techniques are used.

1.3.4.3 Measures to Ensure Representativeness of Laboratory Data

Representativeness in the laboratory is ensured by using the proper analytical procedures, meeting sample-holding times and analyzing and assessing field duplicate samples. The sampling network was designed to provide data representative of Site conditions. During the development of this network, consideration was given to past activities, physical setting, and constraints inherent to the Site Assessment Work Plan. The rationale of the sampling network is discussed in detail in the SAP.

1.3.5 Comparability

Comparability cannot be ensured through use of standard methods and protocols alone. In order to compare data, various important elements need to be considered. During this project, three elements will be evaluated for data comparability. These three elements include analytical methods, quality of data, and sampling design. If after the initial evaluation, data do not appear comparable, the QA Manager will attempt to identify other components possibly affecting comparability, including but not limited to field conditions, sampling protocols, and the occurrence of true data anomalies.

1.3.5.1 Definition

Comparability is an expression of the confidence with which one data set can be compared to another.

1.3.5.2 Measures to Ensure Comparability of Field Data

Comparability is dependent upon the proper design of the sampling program and will be satisfied by ensuring that proper sampling techniques are used.

1.3.5.3 Measures to Ensure Comparability of Laboratory Data

Planned analytical data will be comparable when similar sampling and analytical

methods are used and documented. Similar QA objectives will be used throughout the project to ensure comparability.

1.3.5.4 Level of Quality Control Effort

Field equipment blank, duplicate, and MS samples will be analyzed to assess the quality of data resulting from the field sampling and analytical programs.

1.3.5.5 Field Data

One field duplicate will be prepared for every 20 samples submitted for laboratory analysis. One field equipment blank will be collected every day. Sampling procedures are specified in the SAP.

1.3.5.6 Laboratory Data

Method blank samples are generated within the laboratory and used to assess contamination resulting from laboratory procedures. Field duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the digestion and measurement methodology. All MS are performed in duplicate and are hereinafter referred to as MS/MSD samples. One MS/MSD will be analyzed for every 20 or fewer analytical samples per sample matrix.

1. 4 Documentation and Records

A description of documentation and records can be found in Section 2.3.1 of the QAPP.

Documents and records that will be generated for all aspects of the project include the following:

- Sample collection records;
- QC sample records;
- Field analysis records;
- Fixed laboratory records; and,
- Data handling records.

2.0 DATA GENERATION AND ACQUISITION

2.1 Sampling Process Design

A summary of the type and number of samples required, media, frequency of collection, and associated sampling parameters and test methods are presented in the SAP. The specific sampling methodologies are also discussed in the SAP.

2.2 Sampling Method Requirements

The sample methodologies for each sample type are outlined in the SAP.

2.3 Sample Handling and Custody Procedures

Custody is one of several factors necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody is addressed in three parts: field sample collection, laboratory analysis, and final evidence files. Final evidence files, including all original laboratory reports, are maintained under document control in a secure area.

A sample or evidence file is under one's custody if:

- The item is in actual possession of a person;
- The item is in the view of the person after being in actual possession of the person;
- The item was in actual physical possession but is locked up to prevent tampering; or,
- The item is in a designated and identified secure area.

A summary of the sample identification system, sample handling and custody procedures are presented in the SAP.

2.3.1 Field Custody Procedures

Sample identification documents will be carefully prepared to maintain identification and CoC records and to control sample disposition. Components of the field documentation procedures include the use of field logbooks, sample labels and CoC forms. Original data recorded in field logbooks, CoC records and other forms will be written in waterproof ink. The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched.

2.3.1.1 Field Logbook Records

A field log of daily activities will be used to record sampling activities on a daily basis. This book will be bound and have consecutively numbered pages. Entries in the field

logbook will be made in ink and will include: the name of the author; date and time of entry; location of activity; names and affiliations of personnel on-site; sample collection or measurement methods; number of samples collected; daily weather report; sample identification numbers; field observation and comments; sampling depth increment; field measurements; locations of photographs; and any deviations from the sampling plan. Each logbook will be assigned a project specific document number. The field logbooks will be stored in the office trailer when it is not in use.

2.3.1.2 Sample Labels

Sample labels are necessary to prevent misidentification of samples. Labels will be provided prior to the sampling activities. Each label will contain space for the following information: name of the parcel, sample identification, date and time of sample collection, media sampled, name of sampler, and types of analyses to be performed.

2.3.1.3 Chain-of-Custody Records

CoC documents will be prepared and shipped according to procedures outlined in the SAP.

2.3.2 Laboratory Custody Procedures

Samples, which are delivered by clients or received by courier, will be placed in a secure sample control area immediately upon delivery. Coolers containing samples will be unpacked within ½ hour of receipt or placed in the walk-in cooler until unpacked. The CoC form accompanying the samples will be signed by the LSC or their designee at the time of delivery by the client, or in the case of courier delivery, where the CoC form is sealed inside of the cooler, at the time of unpacking.

At the time of arrival and/or unpacking, coolers will be inspected for evidence of damage. They will be unpacked carefully and the samples will be organized on the lab bench in numerical order or by sample sets and assigned a laboratory job number. The condition of both shipping containers and sample containers will be recorded on the internal CoC form.

Information on the COC shipped with the samples will be verified and recorded as to agreement or non-agreement. Labels will be checked for notation of proper preservation. If there is an apparent non-agreement in the document or incorrect preservation noted, the apparent problem will be recorded and the QA/QC Officer notified. The samples will then be marked or labeled with laboratory sample numbers. Laboratory job numbers are assigned serially, with each sample numbered as a subset of the job number. Finally, samples will be placed in appropriate storage and/or secure areas.

2.4 Analytical Method Requirements

2.4.1 Laboratory Analytical Procedures

Laboratory analytical procedures for soil samples (and groundwater samples, as warranted) collected during the assessment activities include the following:

- Total RCRA Metals, including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver per USEPA Method 6010B or 7470;
- TPH per TCEQ method TX 1005;
- VOC per EPA SW846 Method 8260B;,
- PAH per EPA SW846 Method 8270C; and,
- pH per EPA SW846 Method 9045.

2.4.2 List of Target Compounds and Laboratory Reporting Limits

The reporting limits are provided in the Laboratory's Reference Data Summaries for the required analyses.

2.5 Quality Control Requirements

Internal QC procedures are designed to ensure and document the overall quality of data. Two types of QC checks will be employed to evaluate the performance of the laboratory's analytical procedures. The QC checks represent the system checks and controlled samples introduced into the sample analysis stream that are used to validate the data and calculate the accuracy and precision of the chemical analysis program.

Project QC checks are accomplished by submitting controlled samples into the laboratory from the field. Two external types of QC samples will be used: blanks and duplicates. A duplicate sample will be collected for every 20 analytical samples. Any samples submitted as "blind" samples will be noted in the field logbook and given a sample number that does not indicate to the laboratory that the sample is a QC check.

2.5.1 Laboratory Quality Control Requirements

Laboratory QC checks are accomplished through the use of system checks and QA/QC samples that are introduced into the same analysis stream. Laboratory system checks and QA/QC samples for inorganics are defined below.

- Calibration Blank - A volume of acidified de-ionized water.
- Continuing Calibration - Analytical standard run every 10 analytical samples for inorganics and GC, and per 12 hour tune for Gas Chromatograph/Mass Spectrometer

(GC/MS), whichever is more frequent, to verify the calibration of the analytical system.

- Instrument Calibration - Analysis of analytical standards for a series of different specified concentrations used to define the quantitative response, linearity, and dynamic range of the instrument to target compounds.
- Preparation Blank - An analytical control that contains de-ionized water and reagents carried through the entire analytical procedures. An aqueous method blank is treated with the same reagents as a sample with a water matrix; a solid method blank is treated with the same reagents as a soil sample.
- LCS - An analytical control that contains de-ionized water, reagents, and spiked analytes, carried through the entire analytical procedures. An aqueous Laboratory Control Sample (LCS) is treated with the same reagent as a sample with a water matrix; a solid LCS is treated with the same reagents as a soil sample.

Laboratory QA/QC checks will be performed and samples will be analyzed at a frequency established by appropriate SW-846 protocols for inorganic compounds and appropriate SOPs for analytical methods. The laboratory QAM defines all of the laboratory QC checks criteria. Any QC checks that do not meet acceptance criteria will be handled as discussed in Section 3.0 of the QAPP.

2.6 Instrument/Equipment Testing, Inspection and Maintenance Requirements

To minimize the occurrence of instrument failure and other system malfunction, a preventative maintenance program for field and laboratory instruments will be implemented. Equipment, instruments, tools, gauges, and other items requiring preventative maintenance will be serviced in accordance with the manufacturer's specified recommendations and written procedures developed by the operators. A person certified to repair the instrument will perform maintenance items that cannot be performed by the laboratory technician. The laboratory will be responsible for performing routine maintenance and will have available tools and spare parts to conduct routine maintenance.

Manufacturer's procedures identify the schedule for servicing critical items in order to minimize the downtime for the measurement system. It will be the responsibility of the field instrument operator and the laboratory to adhere to this maintenance schedule and arrange any necessary and prompt service. In addition to any manufacturer recommended maintenance criteria, a maintenance procedure will be developed by the operator based upon experience and previous use of the equipment. Service to the equipment, instruments, tools, gauges, etc., shall be performed by qualified personnel.

2.7 Instrument Calibration and Frequency

Procedures described in this section pertain to the calibration, maintenance, and operation

of equipment and instrumentation to be used during the implementation of the assessment activities. A variety of instruments, equipment, and sampling tools will be used to collect data and samples to determine the nature and extent of source materials and affected sediments and soil. Proper calibration, maintenance and use of instruments and equipment are imperative to ensure the quality of all data collected. A record of calibration and maintenance activities is important to provide legally dependable data.

Instruments and equipment used to gather, generate or measure environmental and physical testing data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility are consistent with the manufacturer's specifications.

2.7.1 Field Instrument Calibration

Field instruments that will be used during this project include a PID. All instruments and equipment purchased or used for the assessment activities will be inspected to ensure that the item meets and performs to manufacturer's specifications and project specifications. Instruments meeting these requirements will be issued to a field technician trained in operation of the instrument.

The PID instrument will be calibrated with the manufacturer's standards. A record of the instrument calibration will be maintained in a bound field notebook and these records will be subject to a QA audit. Information recorded will include the following:

- Date of calibration;
- All data pertaining to the calibration procedures;
- Initials of analyst performing calibration;
- Adjustments made to equipment prior to and following calibration; and
- Record of equipment failure.

Any items found to be inoperable will be taken out of use and a note stating the time and date of this action will be made in the calibration logs. The reason for equipment failure and the time and date of its return to service will also be noted in the logbook. Records produced shall be reviewed, maintained and filed by the field operators. The QCM will audit these records to verify complete adherence to these procedures.

2.7.2 Laboratory Instrument Calibration

All laboratory instrument calibration procedures can be found in the Laboratory QAM and applicable laboratory analytical SOPs.

2.8 Inspection/Acceptance Requirements for Supplies and Consumables

All containers used for samples submitted to the laboratory will be certified clean, unused, laboratory-supplied containers. All other supplies, equipment and instruments to

be used during the assessment activities will be inspected upon arrival to ensure the materials and equipment are clean and the instruments are functioning properly.

2.9 Data Acquisition Requirements

Acquired data are defined as information from any source outside the current activity that may impact the environmental decision-making process. For the assessment activities, this includes data generated during USEPA's previous investigations.

2.10 Data Quality Management

2.10.1 Data Recording

Laboratory analytical data will be provided in electronic downloadable format to minimize any transcription errors. Hard copies of the data with the required signatures will be kept with the field documentation. Field documentation procedures are described in the SAP.

2.10.2 Data Validation

The QCM will review all laboratory data to ensure the data is valid, reliable and usable. The detailed procedures for data validation are presented in Section 4.2 of the QAPP.

2.10.3 Data Transformation/Reduction

Data quality and utility depends on many factors, including sampling methods, sampling preparation, analytical methods, quality control, and documentation. Once all physical and chemical data are validated and assembled, these data are further evaluated with respect to PARCC parameters. Satisfaction of these criteria will be documented as listed below. Chemical data must meet the criteria regarding: (1) quantitative statistical significance, (2) custody and document control and (3) sample representativeness. Physical data must meet criteria regarding: (1) sampling location, time, and personnel; (2) documentation; and (3) methodologies.

To determine the quantitative statistical significance of chemical data, the following items will be documented as appropriate:

- Laboratory/field instrumentation, including calibration data, standard methods, and references;
- Proper sample bottle preparation;
- Laboratory analysis detection limits;
- Analysis of laboratory (reagent) blanks at a frequency of at least one per 20 samples per matrix;
- Analysis of laboratory spikes at a frequency of at least 1 per 20 samples or one per

analytical batch;

- Analysis of field replicates (duplicates or splits) at a frequency of at least 1 per 20 samples for each matrix;
- Analysis of laboratory replicates (duplicates or splits) at a frequency of at least 1 per 20 samples;
- Analysis of field blanks at a frequency of at least 1 per 10 samples for each matrix or one per day, whichever is greater; and,
- Presentation of tabulated QC data.

To evaluate the custody and document control for samples and results, the following items will be documented:

- Field custody noted in field logbook or CoC documentation available;
- Samples transported via courier or hand-delivered to laboratory with CoC documentation available;
- Laboratory custody documented by CoC documentation from either field personnel or shipper;
- Laboratory custody documented through designated laboratory sample custodian with secured sample storage area;
- Sample designation number(s) traceable through entire laboratory monitoring system;
- Field notebooks and all custody documents stored in secure repository or under the control of a document custodian;
- All forms filled out completely in indelible ink without alterations except as initials;
- Identity of sampler; and,
- Date of sample collection, shipping, and laboratory analysis.

To determine sample representativeness, the following items must be checked:

- Compatibility between appropriate field and laboratory measurements or suitable explanation of discrepancy;
- Analysis within holding time limits suitable for the preservation and analysis methods used;
- Sample storage within suitable temperature, light, and moisture conditions;
- Proper sample containers used;
- Proper sample collection equipment used and properly decontaminated;
- Proper sample preservation;
- Proper laboratory preparation techniques used;
- An evaluation of factors to determine bias screening; and,

- Sample Site selection criteria to provide representativeness.

To evaluate the field physical data that support the analytical data, the following items will be documented:

- Sampling date and time;
- Sampling personnel;
- Sampling location;
- Physical description of sampling location;
- Sample collection technique;
- Field preparation techniques;
- Visual classification of sample using an accepted classification system;
- A thorough description of the methodology used and a rationale for the use of that methodology;
- Complete documentation of record-keeping practices;
- Field notebook and all custody documents stored in a secure repository or under the control of a document custodian; and,
- All forms filled out in indelible ink without alterations except as initialed.

2.10.3.1 Field Data Reduction Procedures

Field data reduction is not anticipated for this project. The data will be generated from direct readout instruments. The data will be entered into the field logbook.

2.10.3.2 Laboratory Data Reduction Procedures

Reduction procedures in the laboratory will be performed by computer database that will provide printouts of raw data and chromatograms. The information will be evaluated by the bench analyst to ensure proper integration and assignment of various sample constituents. Lab records will note all other information not processed by computer such as reagents, sample preparations, etc.

The department supervisor will review the lab notebook and associated computer printouts to ensure all information is accurate and no errors have occurred. Prior to laboratory release of the data, QA/QC will be performed to assess precision and accuracy requirements of the data have been met.

2.10.4 Data Transmittal/Transfer

Analytical data will be provided in Excel format and in pdf format. The data may also be available on a secure web-site to allow for tracking sample analysis and receipt of data.

Electronic deliverables of data will allow for transfer of data into summary tables without transcription errors.

2.10.5 Data Analysis

Analytical results of samples analyzed during the assessment activities will be submitted to the PM following a QA/QC review. The results will include a tabulation of the analytical data and an explanation of any field conditions or laboratory QA/QC problems and their effects on data quality. Results of performance audits and system audits will also be included, as appropriate. Proposed corrective action will be recommended in the event that QA problems are identified during review of data quality or results of performance or system audits.

The final report will contain a discussion of QA/QC evaluations summarizing the quality of the data collected and/or used as appropriate to each activity of the project. The objective of the QA/QC summary will be to ensure that the data are representative of conditions on a parcel and sufficient in quality and quantity to support the assessment activities. The QA/QC summary will include:

- Tabulated results of all field and analytical data;
- A report from the QCM evaluating the validity of the analytical data with respect to accuracy, precision, completeness, and representativeness; and,
- A report from the QCM evaluating the results of field and office audits, if conducted.

2.10.6 Data Assessment

Data generated during the assessment activities will be appropriately identified and validated. The QCM will develop a data storage and information system to facilitate and manipulate data for tracking, data calculations, transfer of data to various forms and reports, and transmittal of data into a data storage system. Data packages from the laboratory will be in the form of a Level 2 QC package excluding a sample traffic report and electronic deliverables.

2.10.7 Tracking, Storage and Retrieval

A description of Site documentation and record handling can be found in the SAP.

3.0 ASSESSMENTS AND RESPONSE ACTION

The following procedures have been established to assure that conditions adverse to quality, such as malfunctions, deficiencies, deviations, and errors, are promptly investigated, documented, evaluated, and corrected. When a significant condition adverse to quality is noted, the cause of the condition will be determined and corrective action taken immediately. All project personnel have the responsibility to promptly identify, solicit approved correction, and report conditions adverse to quality. Conditions, which warrant corrective action, include:

- Predetermined acceptance standards are not attained;
- Procedures or data compiled are determined to be faulty;
- Equipment or instrumentation is found to be faulty;
- Samples and test results are questionably traceable;
- QA requirements have been violated; and,
- System and performance audits indicate problems.

3.1 Field Corrective Action

The need for corrective action will be identified as a result of the field audits previously described. If problems become apparent that are identified as a problem originating in the field, immediate corrective action will take place. If immediate corrective action does not resolve the problem, appropriate personnel will be assigned to investigate and evaluate the cause of the problem. When a corrective action is implemented, the effectiveness of the action will be verified such that the end result is elimination of the problem.

Corrective action in the field may be needed when a sampling location is changed, sampling procedures are changed, or field analytical procedures require modification due to unexpected conditions. In general, the PM may identify the need for corrective action. The field staff in consultation with the PM will recommend the corrective action. The PM will approve the corrective measure, which will be implemented. It will be the responsibility of the PM to ensure that corrective action has been implemented.

If the corrective action will supplement the existing sampling plan using existing and approved procedures in the QAPP, corrective action approved by the PM will be documented. If corrective actions result in fewer samples, alternate locations, etc. which may cause project QA objectives not to be achieved; it will be necessary for all levels of project management, including the EPA to concur with proposed changes.

Corrective action resulting from internal field audits will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods.

The QCM will identify deficiencies and recommended corrective action to the PM. Implementation of corrective actions will be performed and documented. The EPA will be notified immediately if any problems affecting data quality occur.

Corrective actions will be implemented and documented in the field record book. No staff member will initiate corrective action without prior communication of findings through the proper channels. If corrective actions are insufficient, the EPA may suspend work.

3.2 Laboratory Corrective Action

The LQAO in consultation with the LPM will initiate the need for corrective action resulting from QA audits. The corrective action will be performed prior to the release of data from the laboratory. The corrective action will be documented in the logbook and submitted to the data validator. If the corrective action does not rectify the situation, the laboratory will contact the PM. If the nonconformance causes project objectives not to be achieved, it will be necessary to inform all levels of management and the EPA. Corrective action may include, but is not limited to:

- Re-analyzing the samples, if holding time criteria permit;
- Evaluating and amending sampling and analytical procedures;
- Accepting data with an acknowledged level of uncertainty; and,
- Re-sampling and analysis, if the completeness of the data set or intended use of the data is recognized during a preliminary review to be insufficient to meet program DQOs.

If the above corrective actions are deemed unacceptable, an alternate laboratory will be selected to perform necessary analyses.

3.3 Assessment/Oversight

The need for corrective action may be determined during either the data validation or data assessment. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples by the laboratory. These actions are dependent upon the ability to mobilize the field team, and whether the data to be collected is necessary to meet the required QA objectives (e.g. the holding time has not been exceeded, etc.). The QCM is responsible for identifying a corrective action situation, documenting the incident, determining the course of action, and implementing the corrective action.

3.4 Immediate Corrective Action

Any equipment and instrument malfunctions will require immediate corrective actions. The laboratory batch in the Laboratory Information Management System ("LIMS") flags exceedences and identifies appropriate immediate corrective actions to be taken when a control limit has been exceeded per the analytical standard operating procedures ("SOP"). They provide the framework for uniform actions as part of normal operating procedures. The actions taken should be noted in field or laboratory logbooks. A detailed description of method-specific corrective action limits is provided in the appropriate method. The QCM must approve any deviation from the prescribed control limits in writing.

3.5 Long-Term Corrective Action

The need for long-term corrective action may be identified by standard QC procedures. Any procedural or data quality problem that cannot be solved by immediate corrective action becomes a long-term corrective action. The essential steps in a corrective action system are as follows:

- Identification and definition of the problem;
- Investigation and determination of the cause of the problem;
- Determination and implementation of a corrective action to eliminate the problem; and
- Verification that the corrective action has eliminated the problem.

Documentation of the problem is important in corrective action. The responsible person may be an analyst, the QCM, the LQAO, sampler, or the PM. In general, the designated QCM will investigate the situation and determine who will be responsible for implementing the corrective action. The QCM will verify that the corrective action has been taken, appears effective, and that the problem has been resolved.

The required corrective action will be documented by the QCM and the PM for field activities. The corrective action will be discussed with the PM and the EPA RPM prior to implementation if the severity of the problem warrants such discussion.

Any changes proposed for amending sampling and analytical procedures will be approved by the EPA prior to implementation. These changes will be documented in monthly progress reports and addendum to the QAPP.

Project management and staff, including field teams, document and sample control personnel, and laboratory groups, will monitor on-going work performance in the normal course of daily responsibilities. The PM will monitor work on the parcels.

Following identification of an adverse condition or QA problem, the QCM will notify the PM of the problem.

3.6 Quality Assurance Reports

Analytical results of samples analyzed during the assessment activities will be submitted to the PM following a QA/QC review. The results will include a tabulation of the analytical data and an explanation of any field conditions or laboratory QA/QC problems and their effects on data quality. Results of performance audits and system audits will also be included, as appropriate. Proposed corrective action will be recommended in the event that QA problems are identified during review of data quality or results of performance or system audits.

The QA report will contain a discussion of QA/QC evaluations summarizing the quality of the data collected (a QA/QC summary) and/or used as appropriate to each activity of the project. The objective of the QA/QC summary will be to ensure that the data are representative of parcel conditions and sufficient in quality and quantity to support the field activities. The QA/QC summary will include:

- Tabulated results of all field and analytical data;
- A report from the QCM evaluating the validity of the analytical data with respect to accuracy, precision, completeness, and representativeness; and
- A report from the PM evaluating the results of field and office audits; if conducted.

A QA Report will be prepared by the QCM upon receipt of sufficient QA data from the laboratory. The report will be a summary of QA/QC results of the analytical work conducted and will be included as part of the QA report.

4.0 DATA VALIDATION AND USABILITY

4.1 Data Review, Validation, and Verification Requirements

Technical data, including field data and results of laboratory sample analyses, will be validated to monitor the performance of the remedial activities. The data collection and QA procedures for validating field and laboratory data are described below.

Field precision is assessed through the collection and measurement of field duplicates at a rate of one duplicate per 20 analytical samples.

4.2 Procedures Used to Validate Data

4.2.1 Field Data

The QCM will perform validation of data. Such validation will be performed by regularly checking procedures utilized in the field and comparing the data to previous measurements. Data that cannot be validated will also be documented.

Field data requiring validation includes the raw data and supportive documentation generated from field investigations and will include, but is not limited to, the following:

- Field notebooks;
- Field investigation daily reports;
- Field instrument readings and calibration data sheet;
- Field log borings;
- Sample labels;
- COC forms;
- Sample tracking records;
- Surveying information; and,
- Maps.

Field measurements that could affect the quality of the data (such as soil water content) will also be validated. Validation of all field data will be performed in terms of meeting DQOs by checking the procedures utilized in the field and comparing the data to previous measurements. The following areas will be addressed during validation:

- Sampling methodology;
- Sample holding times and preservation;
- Field instrument selection and use;
- Field instrument calibration and standardization;
- Field instrument preventative and remedial maintenance;
- Field deviations; and,
- Units of measure and reference points from which field data will be measured.

Additional specific evaluations of data critical to the integrity of the decision making process for this task will be performed on 10 percent of the data and will include:

- COC integrity check;
- Review of the appropriateness of field methodologies;
- Transcription, calculation, completeness, and accuracy check of field data; and,

- Analysis of field notes to determine presence of bias.

If substantial errors are detected, which impact data quality, the scope of the validation will be increased to determine the extent of the problem.

4.2.2 Laboratory Data

Under the direction of the LQAO, laboratory data will be reviewed to ensure that results for samples meet all method-specified criteria. The requirements to be checked in validation are:

- Sample holding times;
- Calibration;
- Blanks;
- Matrix spike/matrix spike duplicate (MS/MSD);
- Field duplicate;
- Target compound identification;
- Spectral interference check sample analysis;
- Compound quantization and reported detection limits;
- System performance;
- Overall assessment of data;
- Interference check sample analysis; and,
- Laboratory control sample analysis.

One equipment blank will be prepared and documented for every day of sampling with non-disposable equipment, to assess the accuracy of sampling techniques. One MS/MSD sample will be analyzed for every 20 analytical samples.

The LPM will be responsible for assessing data quality and advising appropriate laboratory section supervisors of any data that are "unacceptable" or have notations that would caution the data user to possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted as follows:

- Raw data produced by the laboratory technical staff will be turned over to the LQAO.
- The supervisor will review the data for attainment of QC criteria as outlined in method protocols and established TCEQ and EPA methods.
- Upon completion of analytical testing, the LPM will conduct a final review.
- Upon acceptance of the data by the laboratory PM, a computerized report will be generated and sent to the QCM.
- The QCM will complete a thorough audit of all reports.

- The QCM will conduct an evaluation of data reduction and reporting by the laboratory. These evaluations will consider the finished data sheets, calculation sheets, document control forms, blank data, duplicate data, and recovery data for matrix and surrogate spikes. The material will be checked for legibility, completeness, and the presence of necessary dates, initials, and signatures. The results of these checks will be assessed and reported, noting any discrepancies and their effect upon acceptability of the data. In addition, the QCM will check for data consistency by assessing comparability of duplicate analyses, comparability to previous criteria, transmittal errors, and anomalously high or low parameter values. The results of these checks will be reported in writing.

The following is a description of the validation steps that will be used by the QCM to validate the laboratory data. These validation results will be summarized in the QA report. The validation steps are as follows:

- Compile a list of all samples;
- Compile a list of all QC samples;
- Review laboratory analytical procedures and instrument performance criteria;.
- Specific evaluations critical to the integrity of the data include:
- Review of COC documents for completeness and correctness;
- Transcription, calculation, completeness, and accuracy check; and,
- Review of laboratory analytical procedures, appropriateness, and instrument performance criteria.

All data will be reviewed and validated for the following elements, based on information provided on summary reporting forms:

- Data completeness;
- Holding times;
- Calibration;
- Blanks;
- ICP check sample;
- Matrix spike / matrix spike duplicate sample;
- Laboratory duplicate sample analysis;
- Field duplicates;
- Laboratory control sample analyses;
- ICP serial dilution analyses;
- Detection Limits;
- Sample dilutions;

- GC/MS tuning;
- Instrument performance;
- Surrogate recoveries;
- Internal standard areas; and,
- Reporting limits.

If significant errors that affect data quality are detected, the percentage of raw data validated will be increased to assess the magnitude of the problem.

A data summary will be prepared and will include:

- Results;
- Sample media identification;
- Sample location and description;
- Appropriate concentration units;
- Appropriate significant figures;
- Data qualifiers; and,
- Definitions.

The laboratory data summary will be reviewed for potential data quality problems, including:

- Unexpected results;
- Common laboratory contaminants;
- Samples in which dilution was necessary; and,
- Time and date of sample collection.

A sample data summary will be prepared to assess precision, accuracy, and completeness of the analytical data. Laboratory records and data package requirements will be checked to assess completeness of the data package. The validation effort will be done by personnel qualified and experienced in the field of laboratory data validation.

Despite all efforts to achieve the objectives of the project, the potential for error exists in laboratory chemical analyses and in the data reporting process. Every reasonable effort will be made to compare and double-check data reported from the laboratory with data entered into the database management system.

4.3 Reconciliation with Data Used to Access PARCC for Quality Objectives Measurements

This section summarizes the QA/QC procedures used in assessing the quality of the chemical data and the format for presenting the results of the QA/QC evaluations. The data evaluation procedures will be used by the QCM for assessing duplicate and spike samples and checking blank samples that are submitted blind to the analytical laboratories from the field or generated internally by the laboratory, in accordance with this QAPP. The purpose of implementing these procedures is to assess the chemical data generated for accuracy, precision, representativeness, and completeness for both the laboratory analytical program and field sample collection activities.

The primary goal of the program is to ensure that the data generated are representative of environmental conditions at the parcels. Accuracy, precision, representativeness, and completeness will be computed in the manner described in Section 1.3. A qualitative assessment of accuracy, precision, representativeness, and completeness will be made and documented. The goal of the assessment will be to:

(1) establish project-specific PARCC parameters;

(2) use the parameters to develop a database with known limitations of data usability; and

(3) evaluate these limitations in achieving the project DQOs.

Complex statistical data verification and a significance evaluation will not be performed. If a problem arises and the data are found to deviate from previous analyses or surrounding conditions, the data will be annotated. Sample recollection and analysis will be used only in extreme cases of QC problems.

Chemical data will be evaluated according to accuracy, precision, representativeness, and completeness criteria for both the field sample collection activities and laboratory analytical programs. The QA/QC program will evaluate data based on three types of quality control samples (matrix spikes, blanks, and duplicates).

The completeness of the data represents the amount of valid data obtained from the field programs versus the amount of data expected under normal conditions. Completeness will be assessed prior to preparation of the final report. These procedures for evaluating the field and laboratory QA/QC data are the same and are presented below for QA/QC matrix spike, blank, and duplicate samples.

APPENDIX D

HEALTH AND SAFETY PLAN

APPENDIX D
HEALTH AND SAFETY PLAN

(Rev 0)

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Prepared on Behalf of:

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March 2012

Table of Contents
Appendix D - Health and Safety Plan

Attachments

TABLE OF AMENDMENTS		
Amendment:	***Approved by:***	***Date:***

1.0 INTRODUCTION AND AUTHORIZATION

This Health and Safety Plan (HSP) is a component of the Work Plan for environmental assessment of the Al-Kel Site and establishes requirements for protecting the health and safety of workers, visitors and the public during on-site activities conducted on behalf of Al-Kel at the Wilmer facility located at 2012 N. Goode Road, Wilmer, Texas. A Site location map is provided as Attachment A. The objective of this HSP is to present safety information, instructions and procedures for routine and emergency operations. All workers and visitors related to a TITAN project will receive a Site safety briefing and be required to review and acknowledge this HSP. Before field activities at the Site commence, the requirements of this HSP must be communicated to all appropriate personnel, and any required site-specific training must be completed.

This HSP has been developed based on the best available information and for specific and recurring activities conducted at the Site, and as such, the HSP must be periodically reviewed and updated to maintain technical correctness. A written amendment with appropriate approvals will document all changes made to the HSP. In the event of amended task hazards, the most recent amendment will apply.

All work practices and procedures implemented on-site must be designed to minimize personnel contact with hazardous materials where possible and to reduce the possibility of physical injury. All work will be performed in accordance with applicable Occupational Safety and Health Administration (OSHA) regulations 29 CFR 1910 and 1926, State or Local regulations as applicable. TITAN and subcontractors will maintain an ongoing health and safety program, which emphasizes site-specific training, preparedness, implementation and enforcement during all phases of the project. Safety meetings will be held at the beginning of each workday to ensure that all personnel are aware of Site conditions, procedures and personal protective equipment to be utilized. Additional meetings will be held as required to update all personnel of any changing Site conditions or amendments to the HSP.

TITAN HSP AUTHORIZATION		
Name:	***Signature:***	***Date:***
Developed by: Brian Sims, P.G.		
Reviewed by: Louis W. Mixon, III, P.E.		
Reviewed by: Bart H. Gaskill, P.G.		

2.0 GENERAL INFORMATION

Field activities planned for the environmental assessment may include the following:

- Drilling (hollow-stem auger);
- Soil sampling; and
- Groundwater sampling (if warranted).

No existing analytical data for environmental media have been collected. However, the following potential COCs may be encountered during field sampling activities based on chemicals stored on the Site.

POTENTIAL CONSTITUENTS OF CONCERN			
COC	Exposure Limit	Type	Notes
Acetone	250 ppm	PEL	Potential presence
Hydrochloric Acid	5 ppm	PEL	Potential presence
Xylenes	100 ppm	PEL	Potential presence
Ethyl benzene	100 ppm	PEL	Potential presence

† The OSHA permissible exposure limits (PELs), as found in Tables Z-1, Z-2, and Z-3 of the OSHA General Industry Air Contaminants Standard (29 CFR 1910.1000), that were effective on July 1, 1993* and which are currently enforced by OSHA are listed on the page for each chemical in the Pocket Guide. Appendix G: 1989 Air Contaminants Update Project - Exposure Limits NOT in Effect. http://www.cdc.gov/niosh/npg/nengapdxg.html

3.0 PROJECT ORGANIZATION

The following table represents the HSP organization and appropriate contact numbers:

HEALTH AND SAFETY ORGANIZATION		
Al-Kel	Blain Vinson	(972) 205-6129 Mobile (972) 205-6129
TITAN Project Manager	Brian Sims, P.G.	Mobile (214) 564-5392
TITAN Site Safety Coordinator	Brian Sims, P.G.	(469) 365-1100 Mobile (214) 564-5392
EMS – Fire		**911**
EMS – Ambulance		**911**
EMS – Police		**911**
Methodist Charlton Medical Center 3500 West Wheatland Road Dallas, Texas 75237		(214) 947-7777
Poison Control Center N. Central Texas Poison Control – Parkland Hospital		1 (800) 222-1222
On-Site Communications via Mobile Phone		
TITAN Site Safety Coordinator to be Contacted via Mobile Phone Immediately for any Emergency		

4.0 SITE DESCRIPTION AND CONTROLS

The Site is located at 2012 N. Goode Road in Wilmer, Texas. Operations conducted at the Site include washing of frac tanks and tractor trailers. Smaller totes and drums have also been cleaned and reconditioned at the Site. Only authorized personnel wearing the appropriate personal protective equipment ("PPE") will be allowed in the vicinity of activities to be conducted. All personnel and/or guests will be briefed on safety guidelines before entering the work area. Smoking will not be permitted at any time on the Site.

Site communications will be verbal, by established universal hand signals, and/or by mobile phone. Emergency phone numbers and directions to the nearest health care facility are provided as Attachments C and D respectively. The TITAN Site Safety Coordinator ("SSC") shall be contacted immediately for any emergency situation.

4.1 Soil Boring Activities

Soil boring activities are planned at the Site. Additionally, groundwater sampling activities may be performed, if warranted. A State of Texas licensed water well driller is required to drill soil borings. Soil borings are advanced and sampled using direct-push, solid flight auger, and/or hollow stem auger drilling techniques.

The following table presents the objectives and tasks to be performed, with the associated hazards and PPE. This information must be included in job briefings, Site-specific information and daily safety meetings as new tasks are implemented.

TASK HAZARD ANALYSIS			
Objective:	***Task:***	***Associated Hazards***	***PPE Requirements***
Drill Soil Borings and Install Temporary Monitor Wells	Ambient air monitoring; Advancement of soil borings and installation of temporary monitor wells; Disposal of soil cuttings, purge water, and PPE	Noise, Overhead Operations, Underground Utilities, VOC Vapor Hazard, Large Equipment Hazard (Slips, Trips, Falls)	Level D, hearing protection if > 80 dB
Collect Soil Samples	Ambient air monitoring; Collection of soil samples from soil cores; Disposal of sampling equipment and PPE	VOC Vapor Hazard (Slips, Trips, Falls)	Level D
Collect Groundwater Samples	Collection of water samples; Disposal of sampling equipment and PPE	Pump Operations, Splash Hazard (Slips, Trips, Falls)	Level D
Decontaminate Equipment	Disposal of rinse water and PPE	Splash Hazard (Slips, Trips, Falls)	Level D
Level D PPE Ensemble: Work Uniform, Steel-Toed Boots, Safety Glasses, Hard Hat, Nitrile Gloves, Leather Work Gloves			

4.2 Groundwater Sampling Activities

Groundwater sampling activities may be performed at the Site, if warranted. Groundwater sampling activities consist of purging and sampling temporary well screens using bailers or a peristaltic pump and dedicated tubing. Purge water is containerized in properly labeled Department of Transportation ("DOT") 55-gallon drums and stored on-site pending proper disposal.

The following table presents the objectives and tasks to be performed, with associated hazards and personal protective equipment. This information must be included in job briefings, Site-specific information and daily safety meetings as new tasks are implemented.

TASK HAZARD ANALYSIS			
Objective:	***Task:***	***Associated Hazards***	***PPE Requirements***
Groundwater Purging	Purge groundwater from each well; Disposal of purge water and PPE	VOC Vapor Hazard, Traffic Hazard (Slips, Trips, Falls)	Level D
Collect Groundwater Samples	Collection of water samples; Disposal groundwater and PPE	Splash Hazard, Traffic Hazard (Slips, Trips, Falls)	Level D
Decontaminate Equipment	Disposal of rinse water and PPE	Splash Hazard (Slips, Trips, Falls)	Level D
Level D PPE Ensemble: Work Uniform, Steel-Toed Boots, Safety Glasses, Hard Hat, Nitrile Gloves, Leather Work Gloves			

5.0 AMBIENT AIR MONITORING

A calibrated PID will be utilized for measuring potential toxic and organic vapors from soil boring activities. Compound specific monitoring will be evaluated on each specific job and implemented as necessary. The SSC will require a work stoppage and evacuation if any ambient PID reading exceeds 10 ppm. The area will be allowed to vent before determining if drilling can continue.

All Site personnel will acknowledge their review and/or training in accordance with this HSP in Attachment D. NIOSH Pocket Guides to Chemical Hazards for the contaminants of concern are provided in Attachment E.

All monitoring equipment used on-site will be calibrated by TITAN personnel on a daily basis or more frequently, as needed. The calibration information will be recorded in the daily field logbook.

Daily Site and monitoring activities will be recorded by on-site TITAN personnel. Daily Site activities and monitoring information will be recorded in the daily field logbook.

6.0 DECONTAMINATION

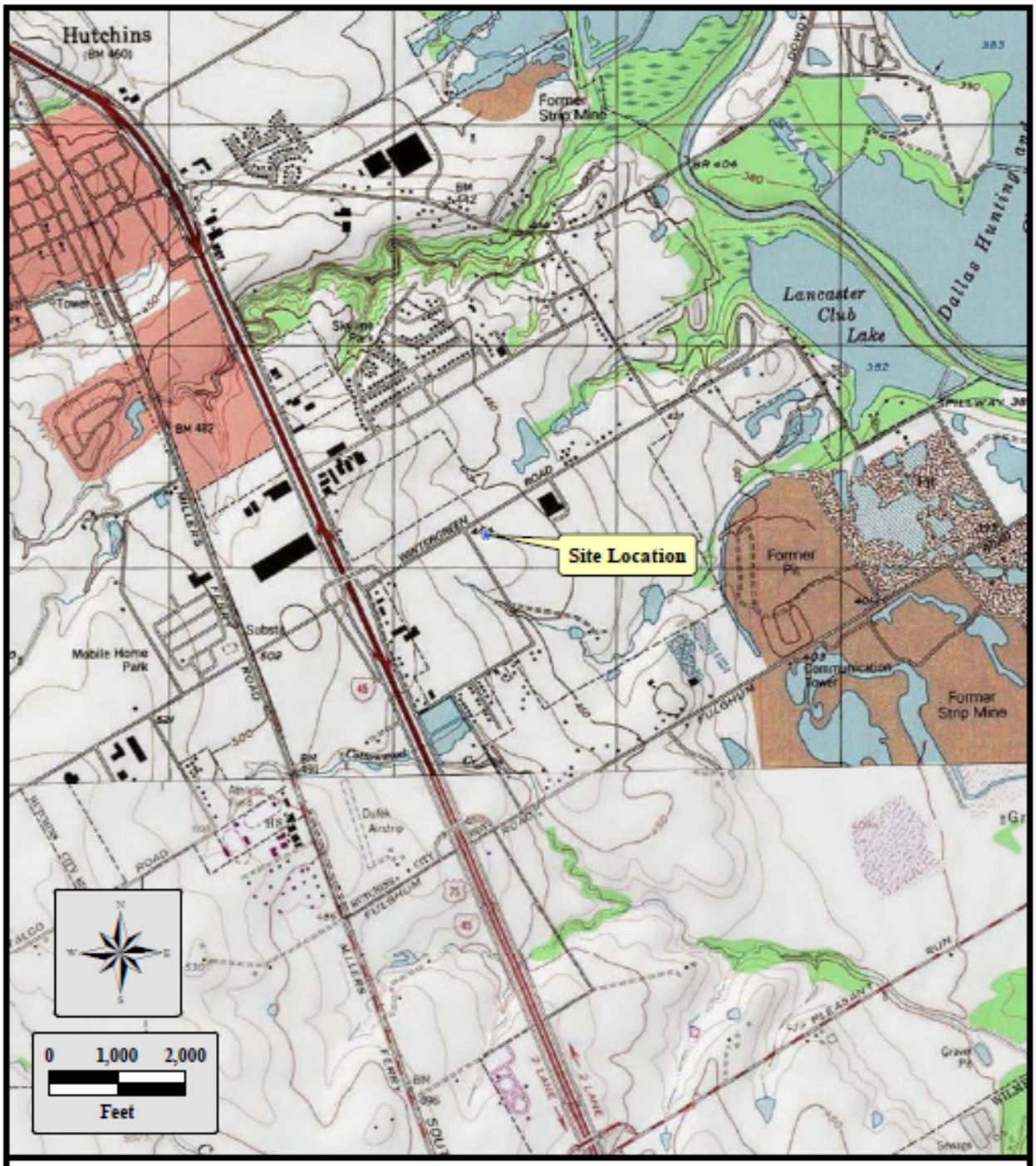
Heavy equipment and drilling equipment will be decontaminated with a high-pressure steam-cleaning unit to remove visible materials. All decontamination rinsate and residual wastes will be properly contained, appropriately labeled, and safely stored for disposal by Al-Kel.

7.0 INVESTIGATION-DERIVED WASTE DISPOSAL

TITAN and its subcontractors will dispose of any IDW generated during any Al-Kel related activity according Al-Kel policies and approvals. TITAN will obtain approval from Al-Kel prior to the off-site shipment of any IDW.

ATTACHMENT A

SITE LOCATION MAP



TITAN Engineering, Inc.
2801 Network Boulevard, Suite 200
Frisco, Texas 75034
Phone: (469) 365-1100 Fax: (469) 365-1199
www.titanengineering.com www.apexcos.com
A Division of Apex Companies, LLC

SITE LOCATION MAP
Al-Kel Alliance, Inc.
2012 North Goode Road
Wilmer, Texas
TITAN Project No. 84800583-01
March 2012
from USGS Quadrangle, Hutchins, Texas.
Digital Data Courtesy of ESRI Online

ATTACHMENT B

EMERGENCY PHONE NUMBERS

HEALTH AND SAFETY ORGANIZATION		
Al-Kel	Blain Vinson	(972) 205-6129 Mobile (972) 205-6129
TITAN Project Manager	Brian Sims, P.G.	Mobile (214) 564-5392
TITAN Site Safety Coordinator	Brian Sims, P.G.	(469) 365-1100 Mobile (214) 564-5392
EMS – Fire		**911**
EMS – Ambulance		**911**
EMS – Police		**911**
Methodist Charlton Medical Center 3500 West Wheatland Road Dallas, Texas 75237		(214) 947-7777
Poison Control Center N. Central Texas Poison Control – Parkland Hospital		1 (800) 222-1222
On-Site Communications via Mobile Phone		
TITAN Site Safety Coordinator to be Contacted via Mobile Phone Immediately for any Emergency		

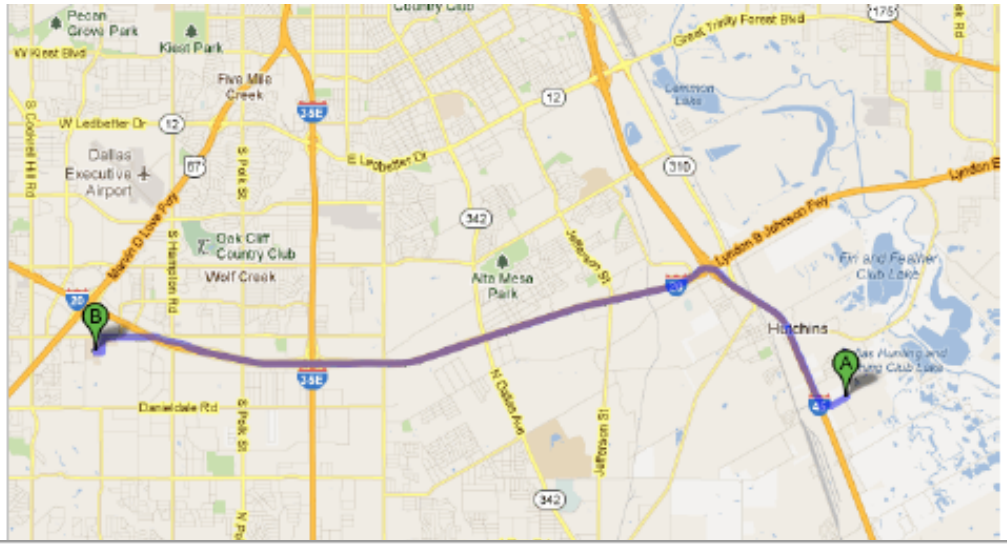
ATTACHMENT C

DIRECTIONS TO HOSPITAL

Directions to Methodist Charlton Medical Center

3500 West Wheatland Road, Dallas, TX 75237 - (214) 947-7777

12.2 mi – about 19 mins



	1. Head **southwest** on **E Wintergreen Rd** toward **N Goode Rd**	go 0.3 mi total 0.3 mi
↱	2. Take the 1st right toward **I-45 Frontage Rd**	go 0.1 mi total 0.4 mi
↱	3. Turn right onto **I-45 Frontage Rd**	go 0.1 mi total 0.5 mi
45	4. Take the ramp on the left onto **I-45 N** About 3 mins	go 2.1 mi total 2.6 mi
20	5. Take exit **276A** to merge onto **I-20 W** toward **Ft Worth** About 8 mins	go 7.9 mi total 10.5 mi
↗	6. Take exit **465** toward **Hampton Rd/Wheatland Rd**	go 0.3 mi total 10.8 mi
	7. Merge onto **Lyndon B Johnson Fwy** About 1 min	go 0.4 mi total 11.2 mi
↖	8. Slight left onto **W Wheatland Rd** About 3 mins	go 0.8 mi total 11.9 mi
↰	9. Turn left onto **Westmoreland Rd** About 1 min	go 0.3 mi total 12.2 mi
↱	10. Turn right Destination will be on the left	go 131 ft total 12.2 mi

B **Methodist Charlton Medical Center**
3500 West Wheatland Road, Dallas, TX 75237 - (214) 947-7777

ATTACHMENT D

PERSONNEL REVIEW & ACKNOWLEDGEMENT

HSP PERSONNEL ACKNOWLEDGEMENT

I acknowledge that I have received a site specific health and safety briefing in accordance with this HSP and have reviewed this document.

Name	*Company*	*Signature*	*Date*

ATTACHMENT E

CDC NIOSH POCKET GUIDES

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People. Saving Money through Prevention.

Search the Pocket Guide

SEARCH

Enter search terms separated by spaces.

Ethyl benzene

Synonyms & Trade Names Ethylbenzol, Phenylethane

CAS No. 100-41-4	**RTECS No.** DA0700000 (/niosh-rtecs/DAAAE60.html)	**DOT ID & Guide** 1175 130 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=130)
Formula $CH_3CH_2C_6H_5$	**Conversion** 1 ppm = 4.34 mg/m³	**IDLH** 800 ppm [10%LEL] See: 100414 (/niosh/idlh/100414.html)
Exposure Limits **NIOSH REL** : TWA 100 ppm (435 mg/m³) ST 125 ppm (545 mg/m³) **OSHA PEL** † (nengapdxg.html) : TWA 100 ppm (435 mg/m³)		**Measurement Methods** **NIOSH** 1501 (/niosh/docs/2003-154/pdfs/1501.pdf) ; **OSHA** 7 (http://www.osha.gov/dts/sltc/methods/organic/org001/org001.html) , 1002 (http://www.osha.gov/dts/sltc/methods/mdt/mdt1002/1002.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html)

Physical Description Colorless liquid with an aromatic odor.

MW:	BP:	FRZ:	Sol:	VP:	IP:
106.2	277°F	-139°F	0.01%	7 mmHg	8.76 eV
Sp.Gr: 0.87	**Fl.P:** 55°F	**UEL:** 6.7%	**LEL:** 0.8%		

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities Strong oxidizers

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma

Target Organs Eyes, skin, respiratory system, central nervous system

Personal Protection/Sanitation (See protection codes (protect.html))	**First Aid** (See procedures (firstaid.html)) **Eye:** Irrigate immediately

Skin: Prevent skin contact **Eyes:** Prevent eye contact **Wash skin:** When contaminated **Remove:** When wet (flammable) **Change:** No recommendation	**Skin:** Water flush promptly **Breathing:** Respiratory support **Swallow:** Medical attention immediately

Respirator Recommendations

NIOSH/OSHA

Up to 800 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection (pgintrod.html#mustread)

See also: INTRODUCTION (/niosh/npg/pgintrod.html) See ICSC CARD: 0268 (/niosh/ipcsneng/neng0268.html) See MEDICAL TESTS: 0098 (/niosh/docs/2005-110/nmed0098.html)

Page last reviewed: April 4, 2011
Page last updated: November 18, 2010
Content source: National Institute for Occupational Safety and Health (NIOSH) Education and Information Division

Centers for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA 30333, USA
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348, New Hours of Operation
8am-8pm ET/Monday-Friday
Closed Holidays - cdcinfo@cdc.gov

Hydrogen chloride

Synonyms & Trade Names Anhydrous hydrogen chloride; Aqueous hydrogen chloride (i.e., Hydrochloric acid, Muriatic acid) [Note: Often used in an aqueous solution.]

CAS No. 7647-01-0	**RTECS No.** MW4025000 (/niosh-rtecs/MW3D6AA8.html)	**DOT ID & Guide** 1050 125 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=125) (anhydrous) 1789 157 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=157) (solution)
Formula HCl	**Conversion** 1 ppm = 1.49 mg/m^3	**IDLH** 50 ppm See: 7647010 (/niosh/idlh/7647010.html)
Exposure Limits **NIOSH REL** : C 5 ppm (7 mg/m^3) **OSHA PEL** : C 5 ppm (7 mg/m^3)		**Measurement Methods** **NIOSH** 7903 (/niosh/docs/2003-154/pdfs/7903.pdf) ; **OSHA** ID174SG (http://www.osha.gov/dts/sltc/methods/partial/t-id174sg-pv-01-8602-m/t-id174sg-pv-01-8602-m.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html)

Physical Description Colorless to slightly yellow gas with a pungent, irritating odor. [Note: Shipped as a liquefied compressed gas.]

MW: 36.5	**BP:** -121°F	**FRZ:** -174°F	Sol(86°F): 67%	**VP:** 40.5 atm	**IP:** 12.74 eV
	Fl.P: NA	**UEL:** NA	**LEL:** NA	**RGasD:** 1.27	

Nonflammable Gas

Incompatibilities & Reactivities Hydroxides, amines, alkalis, copper, brass, zinc [Note: Hydrochloric acid is highly corrosive to most metals.]

Exposure Routes inhalation, ingestion (solution), skin and/or eye contact

Symptoms irritation nose, throat, larynx; cough, choking; dermatitis; solution: eye, skin burns; liquid: frostbite; in animals: laryngeal spasm; pulmonary edema

Target Organs Eyes, skin, respiratory system

Personal Protection/Sanitation (See protection codes (protect.html))
Skin: Prevent skin contact (solution)/Frostbite
Eyes: Prevent eye contact/Frostbite
Wash skin: When contaminated (solution)
Remove: When wet or contaminated (solution)
Change: No recommendation
Provide: Eyewash (solution), Quick drench (solution), Frostbite wash

First Aid (See procedures (firstaid.html))
Eye: Irrigate immediately (solution)/Frostbite
Skin: Water flush immediately (solution)/Frostbite
Breathing: Respiratory support
Swallow: Medical attention immediately (solution)

Respirator Recommendations
NIOSH/OSHA

Up to 50 ppm:
(APF = 10) Any chemical cartridge respirator with cartridge(s) providing protection against the compound of concern*
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern
(APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection (pgintrod.html#mustread)

See also: INTRODUCTION (/niosh/npg/pgintrod.html) See ICSC CARD: 0163 (/niosh/ipcsneng/neng0163.html) See MEDICAL TESTS: 0116 (/niosh/docs/2005-110/nmed0116.html)

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Closed Holidays - cdcinfo@cdc.gov

m-Xylene

Synonyms & Trade Names 1,3-Dimethylbenzene; meta-Xylene; m-Xylol

CAS No. 108-38-3	**RTECS No.** ZE2275000 (/niosh-rtecs/ZE22B6B8.html)	**DOT ID & Guide** 1307 130 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=130)
Formula $C_6H_4(CH_3)_2$	**Conversion** 1 ppm = 4.34 mg/m³	**IDLH** 900 ppm See: 95476 (/niosh/idlh/95476.html)
Exposure Limits **NIOSH REL** : TWA 100 ppm (435 mg/m³) ST 150 ppm (655 mg/m³) **OSHA PEL** † (nengapdxg.html) : TWA 100 ppm (435 mg/m³)		**Measurement Methods** **NIOSH** 1501 (/niosh/docs/2003-154/pdfs/1501.pdf) , 3800 (/niosh/docs/2003-154/pdfs/3800.pdf) ; **OSHA** 1002 (http://www.osha.gov/dts/sltc/methods/mdt/mdt1002/1002.html) See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html)

Physical Description Colorless liquid with an aromatic odor.

MW:	BP:	FRZ:	Sol:	VP:	IP:
106.2	282°F	-54°F	Slight	9 mmHg	8.56 eV
Sp.Gr: 0.86	**Fl.P:** 82°F	**UEL:** 7.0%	**LEL:** 1.1%		

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities Strong oxidizers, strong acids

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

Personal Protection/Sanitation (See protection codes (protect.html))
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures (firstaid.html))
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations
NIOSH/OSHA

Up to 900 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection (pgintrod.html#mustread)

See also: INTRODUCTION (/niosh/npg/pgintrod.html) See ICSC CARD: 0085 (/niosh/ipcsneng/neng0085.html)

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Acetone

Synonyms & Trade Names Dimethyl ketone, Ketone propane, 2-Propanone

CAS No. 67-64-1	**RTECS No.** AL3150000 (/niosh-rtecs/AL3010Bo.html)	**DOT ID & Guide** 1090 127 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=127)
Formula $(CH_3)_2CO$	**Conversion** 1 ppm = 2.38 mg/m³	**IDLH** 2500 ppm [10%LEL] See: 67641 (/niosh/idlh/67641.html)

Exposure Limits

NIOSH REL : TWA 250 ppm (590 mg/m³)
OSHA PEL † (nengapdxg.html) : TWA 1000 ppm (2400 mg/m³)

Measurement Methods
NIOSH 1300 (/niosh/docs/2003-154/pdfs/1300.pdf) , 2555 (/niosh/docs/2003-154/pdfs/2555.pdf) , 3800 (/niosh/docs/2003-154/pdfs/3800.pdf) ;
OSHA 69 (http://www.osha.gov/dts/sltc/methods/organic/org069/org069.html)
See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html)

Physical Description Colorless liquid with a fragrant, mint-like odor.

MW:	BP:	FRZ:	Sol:	VP:	IP:
58.1	133°F	-140°F	Miscible	180 mmHg	9.69 eV
Sp.Gr: 0.79	**Fl.P:** 0°F	**UEL:** 12.8%	**LEL:** 2.5%		

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities Oxidizers, acids

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

Personal Protection/Sanitation (See protection codes (protect.html))
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures (firstaid.html))
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Respirator Recommendations

NIOSH

Up to 2500 ppm:
(APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
(APF = 10) Any supplied-air respirator*
(APF = 50) Any self-contained breathing apparatus with a full facepiece

Emergency or planned entry into unknown concentrations or IDLH conditions:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection (pgintrod.html#mustread)

See also: INTRODUCTION (/niosh/npg/pgintrod.html) See ICSC CARD: 0087 (/niosh/ipcsneng/neng0087.html) See MEDICAL TESTS: 0002 (/niosh/docs/2005-110/nmed0002.html)

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ATTACHMENT F

ACCIDENT, INJURY & INVESTIGATION REPORT

ACCIDENT, INJURY & INVESTIGATION REPORT **TITAN Engineering, Inc.** 2801 Network Blvd. Suite 200 Frisco, Texas 75034 Phone: (469) 365-1100 Fax: (469) 365-1199	
DATE:	***WEATHER CONDITIONS:***
CLIENT: *Al-Kel Alliance*	
PROJECT NO. 73-19	
SITE LEADER:	
SSC:	
EMPLOYEE STATEMENT & DESCRIPTION OF INJURY	
SITE LEADER STATEMENT & DESCRIPTION OF INJURY	
EMERGENCY PROCEDURES / MEDICAL ASSISTANCE	
SIGNATURES	***DATE / TIME***
EMPLOYEE:	
SITE LEADER:	
SSC:	

ATTACHMENT G

DAILY SAFETY MEETING LOGS

DAILY SAFETY MEETING LOG **TITAN Engineering, Inc.** 2801 Network Blvd. Suite 200 Frisco, Texas 75034 Phone: (469) 365-1100 Fax: (469) 365-1199	
DATE:	***WEATHER CONDITIONS:***
CLIENT:	
PROJECT NO.	
SITE LEADER:	
SSC:	
REVIEW OF SITE CONDITIONS AND TASKS TO BE PERFORMED:	
ADDITIONAL SITE SAFETY CONCERNS OR CHANGING CONDITIONS NOTED:	
SIGNATURES	***DATE / TIME***
SITE LEADER:	
SSC:	

DAILY SAFETY MEETING LOG **TITAN Engineering, Inc.** 2801 Network Blvd. Suite 200 Frisco, Texas 75034 Phone: (469) 365-1100 Fax: (469) 365-1199	
DATE:	***WEATHER CONDITIONS:***
CLIENT:	
PROJECT NO.	
SITE LEADER:	
SSC:	
REVIEW OF SITE CONDITIONS AND TASKS TO BE PERFORMED:	
ADDITIONAL SITE SAFETY CONCERNS OR CHANGING CONDITIONS NOTED:	
SIGNATURES	***DATE / TIME***
SITE LEADER:	
SSC:	

APPENDIX E

SCHEDULE

TITAN Engineering, Inc.
A Division of Apex Companies, LLC

APPENDIX E - PROPOSED SCHEDULE

Al-Kel Alliance, Inc.
2012 N. Goode Road
Wilmer, Texas 75172

	Tasks	2012									
		March 18-24	March 25-31	April 1-7	April 8-14	April 15-21	April 22-28	April 29-May 5	May 6 - 12	May 13-19	May 20-26
1	Work Plan Submittal to EPA	(March 23) ◆									
2	EPA Review of Work Plan		▬	▬							
3	EPA Approval of Work Plan			(April 6) ◆							
4	Scheduling Field Personnel and Subcontractors				▬	▬					
5	Field Sampling (soils only)						▬				
6	Results Evalation and Report Preparation						▬	▬	▬	▬	▬
7	Environmental Assessment Report Submittal to EPA										(May 25) ◆

Green indicates EPA tasks
Blue indicates Al-Kel tasks
Note: Updates to this schedule may be required depending on review times and assessment findings.